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## CONTENTS

## POLITICAL AND SOCIOLOGICAL

- Nakasone's LDP Inter-Factional Maneuver Analyzed  
(SENTAKU, Jul 83) ..... 1

## MILITARY

- Chronological Listing of Top Personnel of Japan Defense Agency  
(BOEI HANDOBUKKU, 1982) ..... 7
- Japan's Rearmament Prospect Discussed  
(P. Lewis Young; ASIAN DEFENCE JOURNAL, Jun 83) ..... 9

## ECONOMIC

- Nakasone's Relationship With Business Circles Deteriorates  
(ZAIKAI KORON, Jun 83) ..... 15
- Realities of Former Government Employees Reported  
(Various sources, various dates) ..... 22
- Double-Dipping Continues  
Former Government Employee Paradise
- Mitsubishi's Structural Weakness Disclosed  
(JITSUGYOKAI, 1 Jun 83) ..... 34
- Japanese Anxiety Over 'Look East' Policy Examined  
(Charles Chan; KUALA LUMPUR BUSINESS TIMES, 2 Jul 83) ... 41

## SCIENCE AND TECHNOLOGY

- Status of Japan's Defense Industry Examined  
(SEIKEIJIN, Apr 83) ..... 42
- Image Processing for Synthetic Aperture Radar Described  
(Itsugu Takeshi, et al.; TOSHIBA REBYU, May 83) ..... 56
- Design and Application of Toshiba's 64 K CMOS RAM Discussed  
(Kiyofumi Ochii, et al.; TOSHIBA REBYU, May 83) ..... 65

POLITICAL AND SOCIOLOGICAL

NAKASONE'S LDP INTER-FACTIONAL MANEUVER ANALYZED

Tokyo SENTAKU in Japanese Jul 83 pp 44-47

[Article by unattributed author: "Prime Minister Nakasone Who Became Aware of 'Long-Term Incumbency.'" ]

[Text] I have not seen a sullen face on Prime Minister Nakasone lately. He was in a strikingly good mood during the Upper House election campaign; and the tenor of his speeches rose. At a campaign meeting in Kagoshima on 19 June, he gave a delightful speech. "The Liberal Democratic Party (LDP) has done well with its successive pitching strategy as the presidency has changed from time to time. After former Prime Minister Shigeru Yoshida's straight balls, Hatoyama pitched strikes with his softball. And after former Prime Minister Zenko Suzuki's easy curves, we have Nakasone's stright balls." One does not talk about pitching strategy when one is in a decline. That is because it would quickly become material for speculation about who will pitch after Nakasone. However, Nakasone has some elbowroom now.

Because Nakasone fought off the double election of both Upper and Lower Houses, strongly advocated by former Prime Minister Tanaka, and was completely involved in promoting the Upper House election while the LDP was in a dominant position, he perhaps deepened his self-confidence---"The situation is fairly safe now." Moreover, when he returned from the Williamsburg Summit (the meeting of the major advanced nations) on 2 June, the day before the public announcement of the Upper House election, Nakasone's support ratio recovered unexpectedly. The appraisal of Nakasone regarding "diplomacy" rose suddenly. The opposition parties who were sure that Nakasone's hawkish military expansion line would be gradually abandoned by the people were disconcerted. Chairman Kasugada of the Japan Socialist Party made the analysis that "perhaps his seemingly clear and crisp way of speaking and acting matched the mood of an eager desire for a hero." And Secretary Yano of the Komei Party said: "His showy grandstanding at the summit gave the impression that he had taken an active role in rivalry with the European countries; and perhaps that tickled the people's spirit of pride in Japan as a major power."

Although these comments were made, the fact of the recovery of his popularity cannot be erased.



## Truth about the Double Election Evasion

However, if some kind of regret remains for Nakasone, it would be that it might have been better for him to have been bold and held the double election. Since his popularity had continued to decline since his assumption of office, Nakasone was very fearful of a defeat in both the Upper and Lower houses in a double election. Ironically, as soon as he overcame the risky tug-of-war with Tanaka in the hope of avoiding the double election, his support ratio made a U-turn.

It is said that shortly after the start of the Upper House election, Chief Cabinet Secretary Goroda made the following statements.

"Because the authority to dissolve the Diet is the exclusive right of the prime minister, it was perfectly alright for him to do that (i.e., evade a double election). But it will be disadvantageous for him. When I was asked by the prime minister, I said: 'Yes, that (the double election) is the best course.' But since he didn't go along with it, that's that. After all, if we're careless, we would lose both elections. That was the problem. But when we look at it now, his popularity is up in the public opinion polls. Haha. Well, it's not easy to understand this kind of issue. I feel that one shouldn't be so shackled by various different opinions."

As Nakasone's right hand man, he expressed himself in quite an outspoken way. In any event, it seems that he tried to say that in his own mind Nakasone must be embarrassed at his ignorance and Nakasone should have gone along with Tanaka's idea. "Different opinions" meant the opposition to the double election by former Prime Minister Fukuda and others.

However, it does not seem that the background of the double election evasion is that simple. Of course, there was the fear of a simultaneous defeat in both Upper and Lower Houses. And Nakasone was strongly opposed to attending the summit after a dissolution of the Diet. For no less reason than that, or, more than that, Nakasone was concerned about how to administer the party after the Upper House election.

It can only be said that the intra-party base of Nakasone who is fourth in line of power after the three major factions of Tanaka, Suzuki and Fukuda is fragile. But Nakasone's good fortune was the "divine wind" of the Lockheed incident. Nakasone barely had his turn simply because the Tanaka faction, the largest faction, cannot back its own candidate for the presidency and therefore continues to back a "substitute."

Likewise, even though there is no Tanaka faction candidate, if two of the three major factions were to join together, Nakasone's footing would become uncertain. Even though a "Tanaka-Fukuda" coalition cannot even be imagined, a tie-up between "Suzuki and Tanaka" or "Suzuki and Fukuda" can always be considered possible. Consequently, the basis of Nakasone's intra-party rule is the maintenance of the three-cornered contest among the three major factions and operating so as to continue that balance.

On that point, the most notable change since the start of the Nakasone regime has been the sensitive movement of the Suzuki faction. The Suzuki faction has made clear, both internally and externally, its intent to create a "Miyazawa government" by making Kiichi Miyazawa the acting representative of the faction. And moreover, it made clear its opposition as a faction to the double election of the Upper and Lower Houses. Suzuki made speeches critical of Nakasone's hawkish attitudes.

The Suzuki faction's method of dealing with this showed both its strength and weakness. Its strength was that this showed that the faction had united more quickly than any other faction in its post-Nakasone objective. In the case of Shintaro Abe of the Fukuda faction, the faction's successor remains as indefinite as ever. And there are too many unknowns with Noboru Takeshita of the Tanaka faction. But even though the objective is the post-Nakasone period, nothing will be accomplished by just one faction. But by opposing the double election, the Suzuki faction demonstrated that its partner is not necessarily the Tanaka faction. The hidden meaning in this is that there might have been a "Suzuki-Fukuda" tie-up if Nakasone had forced through the double election. In the past, during the Fukuda administration, great headway was made in the maneuvers for a Ohira-Fukuda coalition by combining Fukuda as prime minister and Ohira as secretary-general.

The major strategy was the attempt to form the mainstream of conservative politics with an "Ohira-Fukuda" axis, eliminating Tanaka. But not only did it end in failure; conversely, it induced a contentious "Ohira-Fukuda" quagmire. There is now what may be called a revival of this. But instead of "Suzuki-Fukuda," it will actually be a "Miyazawa-Abe" coalition. If a "Miyazawa-Abe" tie-up materializes and one part of the three-cornered mainstream factional system (Nakasone-Tanaka-Suzuki) becomes alienated, this would be a threat for Nakasone and Tanaka. With the Lockheed verdict, the isolation of the Tanaka faction would accelerate even further and it might be difficult for Nakasone to maintain the government. The uniting of the Suzuki faction was equivalent to sticing a knife into the "Nakasone-Tanaka" coalition.

#### A Favor for the Suzuki Faction

Even so, if the double election had been rushed into, the Suzuki faction would have had within itself the weakness of possibly becoming hard pressed. That is to say, an overwhelmingly large number of the new members elected during the Ohira administration in the general elections of both October 1979 and June 1980 were members of the Suzuki faction; more than 20. But the new members have not solidified their base. Moreover, it is said that the overwhelming victory in the 1980 election is like a water blister for the LDP. If there were a return to the original situation, there is the strong probability that the loss of weight (i.e., numbers) would be taken from the Suzuki faction.

Not only that, due to the Tanaka faction's expansion of power policy, there is a noticeable flood of candidates, and the number of election districts where both the Suzuki and Tanaka factions clash has increased. If an election battle were held now at the Tanaka faction's pace, it is definite that the result would be an "expansion of the Tanaka faction and a reduction of the Suzuki faction" even if it were after the Suzuki faction had made further election preparations.

And if so, no matter that the Suzuki faction has its aims set for the post-Nakasone period, it is doubtful that it would be Miyazawa. It seems that the Suzuki faction assumed its defiant attitude in desperation.

The choice for Nakasone was a difficult one. Force the election or avoid the election? It is unknown which would have the best results for Nakasone unless tried. A close associate of Nakasone uttered the following comments.

"We were at a loss. Naturally. But I think that in the end it was made out of consideration for Suzuki. That is because Miyazawa has not yet come of age. I feel that was his real intent. However, even if there had been a double election and defeat, Nakasone would not have been out. Since there has been no provision made for who will be next, we won't have Miyazawa soon."

If so, Nakasone's real intention can be understood. He simply faithfully followed the basic principles of intra-party administration. By avoiding the double election and extending a helping hand to the Suzuki faction, he applied the brakes to any move to a "Suzuki-Fukuda" coalition and his own separation from the mainstream factions. It may be said that, going farther than is proper with regard to policy lines, Nakasone went forth with his intra-party counter-measures very cautiously.

Nakasone rejected Tanaka's request for a double election. On this point, he seemed daring. And it is certain that Nakasone faced this with considerable determination. However, even for Tanaka, if his relationship with the Suzuki faction were to become distant, he would lose the close, continuous allies he has had in the party extending from Ikeda, Maeo, Ohira to Suzuki. While Tanaka was very angry, the fact that he laid down his sword attests to the fact that Nakasone's strategy was not necessarily detrimental to Tanaka.

This avoided a crisis for Suzuki and Miyazawa as well. It is said that now that the double election was allowed to pass, Miyazawa is concentrating his energies into factional responsibilities and the national campaign. And Suzuki is also urging that "before you run in the presidential election, I will promote you from acting chairman to chairman. Act without restraint." An "association to elect Kiichi Miyazawa prime minister" was started among some of the people from his hometown, Hiroshima, and his fellow alumni; and planning is progressing. But it is not yet to the point where Nakasone has increased his concern to an extreme level about Miyazawa as a strong rival. As the Nakasone associate mentioned earlier stated, both Tanaka and Nakasone see that Miyazawa must move one step further (to become a serious rival). Otherwise, Nakasone might have joined with Tanaka and rushed into the double election even with the risk and taken measures to "suppress Miyazawa" due to a decline in the Suzuki faction.

#### Movements of Miki and Kawamoto Require Attention

When Suzuki was advocating opposition to the double election, Fukuda and Miki, who has been insisting on the same thing, tried to make a sudden approach toward Suzuki. And once there was even a scene to show the three of them meeting together in the Lower House assembly hall. But because of Nakasone's avoidance

of the double election, this three-man approach which gave indication of a move into an anti-"Nakasone-Tanaka" position lost the pillar of a common front. On 19 June while campaigning in Toyama prefecture, Fukuda emphasized that his "anti-Tanaka" passion had not diminished. He said: "I think everyone is dissatisfied with the LDP. When political power is held for a long time, dirt and stains appear in the LDP; and even mosquito larvae begin to hatch. I, who am the 'Komon of the Showa Era,' will take responsibility and do a complete general housecleaning." But it is no longer thought in the LDP that Fukuda will have a starring role in conquering Tanaka. One reason is that Fukuda showed great interest in the proposal of a division of "Nakasone as prime minister and Fukuda as president" in the finale of the drama of changing the government at the end of last year. Immediately after that, he was disgraced like a clown when he was crushed by Nakasone and Tanaka. A second reason is that Fukuda made a promise with Nakasone not to pursue placing blame in a defeat in the Upper House election when Nakasone decided to evade the double election. In other words, it is a matter of Fukuda's "anti-Tanaka attitude." In the intra-party leadership disputes, Fukuda has not moved even one step away from the level of repeating the "Tanaka-Fukuda" tug-of-war. In the actual results of the tug-of-war, Tanaka is always the winner and Fukuda seems to be someone who lacks power and is undependable. So his mosquito larvae general housecleaning theory lacks punch.

Rather, the view within the LDP has moved elsewhere beyond the "Tanaka-Fukuda" rivalry. In the political situation before and after the first court ruling on Tanaka which will come down in the fall, what will Miki whom Tanaka hates with a deep-seated hatred as an old enemy try to do? This spring, there was a rumour that the Miki group planned to withdraw from the party, but now all is quiet. But Miki has more "anti-Tanaka" vindictive feelings than Fukuda. Miki is keeping a watchful eye on Kawamoto. When Kawamoto makes up his mind that he has no chance for political power, there may be a final rally of the Miki-Kawamoto group. It would be a movement of political reform and reorganization of the political world with "anti-Tanaka-ism" as the slogan. If this happens, the whole political world, including the opposition parties, would be severely shaken and the Nakasone government would also not be safe. But it seems that so far Nakasone has made light of that difficulty as a major concern. On the contrary, the statement in the opening paragraph of this article, "the LDP is doing well in its pitching strategy," indicates that he has no intention of letting someone else pitch. He has started to be deliberate about a long-term government. Perhaps Nakasone's immediate method for riding out the political situation is to suppress to the best of his ability attempts to put forth one of the new leaders, Miyazawa, Takeshita or Abe, by carrying out intra-party rule through maintaining the balance among the factions, as mentioned earlier. And another method is to adeptly seize the right timing for a dissolution of the Diet and a general election and devote all his strength to the maintenance of the LDP's stabilizing force. And if this goes as expected, it can be thought that the route will be opened to a long-term government after his reelection as president next year.

#### Pusillanimous New Leaders

There are too many unstable factors in the future of this administration which now seems to be in a favorable position. To be certain, none of the new leaders happens to have enough ability to lead a move "to bring down Nakasone." For the



present, Miyazawa has his hands full with maintaining his own faction; Abe and Takeshita are tied up in the cabinet. Concerning the evasion of the double election, there was the rumor in political circles that "Nakasone called Takeshita and said: 'The next government will be a Takeshita government.' And he also said to Abe: 'You will follow Takeshita.' He won favor with both of them. And it seems he completed an encircling net around Tanaka." This story is too good to be true. Even if Nakasone didn't pay them lip service, Abe and Takeshita could not become Nakasone's strong rivals unless they first get through the barriers to independence. In an address at the Japan Press Club on 20 June, Abe simply stated: "The relationship between Nakasone and me is delicate but going well. If it weren't going well, I would have to resign. But at present our opinions on measures regarding the United States, U.S.S.R. and Korea are in agreement. At any rate, setting aside foreign affairs, I say what I want to say about domestic politics and problems within the LDP. I am not altogether satisfied with the present situation in the LDP." He was not very clear-cut in what he said.

But it is quite possible that the Nakasone government will die even though one of these three does not become a threat in his eyes. Just as Suzuki pitched after Ohira's sudden death, a successor prime minister will be decided no matter what the situation.

For Nakasone, the number one future uncertainty is the Tanaka verdict. The rumor is floating around that Nakasone will dispose of Tanaka by himself. But if he fails to deal with the court ruling, the continuation of his administration will be threatened beyond imagination. The second concern is the attitude on policy permeating Nakasone's hawkish faction. Before and after the Upper House election, Nakasone was easy-going in both word and manner. And it is already known that he is a leader of strong conviction of the same character as Nobusuke Kishi who suffered a setback in midcourse. Therefore, when the Nakasone line begins to be disliked by the people, the flexible factions within the LDP will seriously consider "cutting" Nakasone. Amid the upheaval of the court verdict, if the propriety of Nakasone politics is called into question, he may be hit with a double crisis.

It is difficult to predict whether he will find his way out of the "political situation of the fall" on the strength of his characteristic luck.

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# MILITARY

## CHRONOLOGICAL LISTING OF TOP PERSONNEL OF JAPAN DEFENSE AGENCY

Tokyo BOEI HANDBOOK in Japanese 1982 pp 142-145

[Text] Top Personnel of Japan Defense Agency  
(1970-present)

<u>JDA Directors:</u>	<u>JDA Parliamentary Vice ministers:</u>	<u>JDA Administrative Vice ministers:</u>
Yasuhiro Nakasone (1970-71)	Yoshihiko Tsuchiya	Hitoshi Utsumi
Keikichi Masuhara (1971-71)	Kyoichi Noro	
Naoki Nishimura (1971-71)		
Masumi Esaki (1971-72)		
Keikichi Masuhara (1972-73)	Hiroo Furuuchi	Yutaka Shimada
Sadanori Yamanaka (1973-74)	Noboru Minowa	
	Haruo Kino	
Sosuke Uno (1974-74)	Shiro Tananabe	Kazumasa Tashiro
Michita Sakata (1974-76)	Yozo Kato	Takuya Kubo
Asao Mihara (1976-77)	Kokai Nakamura	Noboru Maruyama
	Koichi Hamada	
Shin Kanemaru (1977-78)	Shuichi Takenaka	
Ganri Yamashita (1978-79)	Motoharu Arima	Akira Watari
Enji Kubota (1979-80)	Makoto Someya	
Yoshizo Hosoda (1980-80)		Tooru Hara
Joji Omura (1980-81)	Taku Yamazaki	
Seichiro Ito (1981-82)	Hisao Horinouchi	Minoru Yoshino
Kazuo Tanikawa (1982- )	Taikan Hayashi	

Chairmen of Joint Staff Council:	Chiefs of Staff Ground SDF:	Chiefs of Staff Maritime SDF:	Chiefs of Staff Air SDF:
Takashi Itaya (1970-71)	Masao Yamada Toshio Kinugasa	Kazutomi Uchida	Kagetoshi Ogata
Toshio Kinugasa (1971-73)	Ryuhei Nakamura	Suteo Ishida	Yasuhiro Kanda
Ryuhei Nakamura (1973-74)	Toshiro Magari	Hiroichi Samejima	Tsurayuki Ishikawa
Motoharu Shirakawa (1974-76)	Hideo Miyoshi		Motoharu Shirakawa
Hiroichi Samejima (1976-77)	Hirotsomi Kurusu	Teiji Nakamura	Yoshitaka Tsunoda
Hirotsomi Kurusu (1977-78)	Takehiko Takashina	Ryohai Oga	Akira Hirano
Takehiko Takashina (1978-79)	Shigeto Nagano		Goro Takeda
Goro Takeda (1979-81)	Toshimichi Suzuki	Taugio Yada	
Taugio Yada (1981-82)	Sumio Murai	Masaru Maeda	Osamu Namatame
Sumio Murai (1982- )	Keitaro Watanabe	Manabu Yoshida	Shigehiro Mori



## MILITARY

### JAPAN'S REARMAMENT PROSPECT DISCUSSED

Kuala Lumpur ASIAN DEFENCE JOURNAL in English Jun 83 pp 49-52

[Article by Reporter P. Lewis Young: "The Realities Behind the Rhetoric"]

[Excerpt] Recent statements by the Japanese Prime Minister, Mr. Yasuhiro Nakasone, have lead Western journalists to speculate that Japan is on the verge of rearmament. No so, concludes our regular Far East/Pacific correspondent P. Lewis Young. He argues that Mr. Nakasone's international image as a dynamic 'hawk' rests uncomfortably with political realities in Japan - both in terms of the electorate's adherence to pacifism and his own party's instinct for political survival.

To warm or not to warm? That seems to be the question in Tokyo, if one can believe the Western media. I believe, however, that one cannot believe the Western media, which is concerned far more with the creation of a 'good story' than actual analysis of the issues involved.

Certainly Mr. Yasuhiro Nakasone makes good news. He is substantially different from Japanese leaders of the past. Japanese leaders in the past have usually tried to hide their personal views on many issues. Mr. Nakasone has made plain his personal views on a great many controversial issues. Mr. Nakasone has done this in very unusual fashion. He issued a draft work to foreign correspondents in Tokyo under his own name entitled "My Life in Politics by Yasuhiro Nakasone". In this hastily prepared document of December 1982, Mr. Nakasone presents himself as a man of action. A policy initiator rather than the bland creator of consensus among competing factions.

*"Times of relative stability produce consensus-type leaders, while times of upheaval and transformation often produce leaders with clear vision, initiators given to bold decisions."*

*"As a politician, I have been regarded as belonging, as much as I belong to either, to the second of these two admittedly simplified categories."*

*"I believe the traditional tools of consensus politics alone cannot cope with the many challenges of administrative reform, trade frictions, the defence issue and other problems which demand of leadership clear vision and firm decisions in both foreign and domestic policy."*

Mr. Nakasone goes on to describe his role in Japanese politics. In hindsight a role necessarily enhanced, by his present position.

In particular he makes much of his political activities after having been discharged as an officer in the Imperial Japanese Navy at the end of World War 2. Mr. Nakasone must have been a remarkable young man. He was elected to the Japanese House of Representatives in 1947 at the age of 28, and was then the youngest member of the Diet — It must be remembered that whole generations of Japanese politicians had been rendered politically impotent by the war and its aftermath. Significantly Mr. Nakasone describes himself as an opponent to the Japanese Constitution created by the Occupation Administration of General Douglas MacArthur in 1947, a constitution created with little reference to Japanese opinion.

The Constitution has put great limitations on the development of Japan's Self Defence Forces (JSDF).

Dr. H.L. Seymour of the University of Colorado has concluded:

"For good or ill, Article 9 and pacifism are now much a part of Japanese political culture and constitutional debate. It is quite conceivable that suits will continue to be brought against the government on such issues as the constitutionality of the size of the SDF, the location of bases, types of armaments and the uses which should be made of SDF units."

(*Pacific Affairs*, 47, 4, 1975: 436)

As a consequence of this, successive Japanese governments have had to build up the JSDF with an eye to possible legal challenge and popular antipathy against Japanese re-armament.

Popular resentment against anything to do with the Japanese military was to be expected after the shame of defeat and occupation after 1945.

Mr. Nakasone, in his document handed out to Western correspondents, highlights the fact that he opposed the 'Peace' constitution of 1947 from the beginning. Nakasone wrote a 7,000 word petition to MacArthur calling for Japan's right to have some sort of rudimentary arms industry for its own defence, the right of Japan to study atomic energy for peaceful purposes, and to produce civil aircraft.

Mr. Nakasone quotes a Japanese reporter who had information of the American General's reaction to Nakasone's petition of 1947.

"General MacArthur read the document with a growing look of displeasure on his face.

"He tried to tear the document up but it was too thick, so he folded it and flung it at a waste basket.

"The document, however, came unfolded and popped out of the waste basket, falling to the floor.

"Dr Justin Williams (chief of the parliamentary and political division in the government section of the Supreme Commander of the Allied Powers) later contributed that document to the University of Maryland Library, where it remains today," Mr Nakasone writes.

Mr. Nakasone continues his autobiography after this incident: "A trip to Europe and the United States immediately after the outbreak of the Korean war gave me first hand exposure to the stark realities of international politics and had forced me to look seriously into how to preserve Japan's own security.

"Immediately after my return I spoke with Hitoshi Ashida, then head of the Democratic Party and who had served as Prime Minister in 1948, and appealed to the Japanese people for the establishment of a Japanese self-defence force.

"At the time, most of Japan's journalists and scholars were moved by an unrealistic, fantastical pacifism, and were quick to label us conservative reactionaries. The more extreme among them even condemned us as militarists, but I did not waver in my resolve . . . "

" . . . I was convinced that complete independence would come only when Japan was capable of administering and defending itself and of contributing in some measure to the security and well-being of other States.

"For this reason I called for an immediate revision of the constitution following independence, and for the establishment of an independent defence system under total civilian control.

"Even today I think my proposal was eminently reasonable. However, it lead many Americans to regard me as a dangerous individual, steeped in a rabid nationalism."

Through his autobiography, Mr. Nakasone develops a picture of a man with unusual intents, given the pacifism which has been the cornerstone of Japanese post-war politics.

Mr. Nakasone implies that he is a man temperamentally suited to the task of guiding Japan into a new era of *re-assessment* of its post-war pacifism. This image has struck a responsive chord in the West - especially the United States.

Shortly after his election to the leadership of the Japanese Liberal Democratic Party - and hence the Japanese Prime Ministership (the LDP is the party in power in Japan's Diet) the United States' Senate called on Japan to increase its defence spending. The U.S. Senate Foreign Relations Committee prior to taking its 1982 Christmas recess had recommended that Japan increase its defence spending to 1.5-2.0% of GNP, that Japan pay a greater share of the operating costs of U.S. forces in Japan and play a much greater role in the maintenance, repair and overhaul of American military equipment in Japan.

Mr. Nakasone met President Reagan on 18 January 1983. After that meeting he gave a most remarkable interview to the *Washington Post*.

"The whole Japanese archipelago should be like an unsinkable aircraft carrier putting up a tremendous bulwark of defence against infiltration of the (Soviet) Backfire bomber," Mr. Nakasone said.

"To prevent Backfires from penetrating through this wall should be our first goal," [Mr. Nakasone said his second defence aim would be to] have complete and full control of four straits that go through the Japanese islands so that there should be no passage of Soviet submarines".

"If we are to establish sea lanes, then our desire would be to defend the sea lanes between Guam and Tokyo and between the Strait of Taiwan and Osaka."

This, of course, sounded exactly what many Americans wanted to hear. It implied that Tokyo was truly on the verge of committing itself to a programme of rearmament whereby Japan would take on the initial task, in time of conflict, of

'bottling up' the Soviet Pacific Fleet and Air Force whilst the U.S. Seventh Fleet was able to undertake tasks elsewhere.

Such a view, however, was an exceedingly optimistic one. It is necessary to see Mr. Nakasone's stance before Western journalists in the perspective of Japanese internal politics.

It is important to distinguish between what Mr Nakasone has been saying to the Western media and what he has been saying to the Japanese electorate.

Whilst Mr. Nakasone was releasing his draft political biography to Western journalists with its hints of change in the Japanese post-war defence posture, he was also assuring the Japanese people that defence expenditure would *not* exceed the limit of 1% of GNP. When the content of his *Washington Post* interview was released in Japan, Mr. Nakasone tried to dampen the subsequent furore by firstly denying that the interview had ever taken place. The *Washington Post* produced a tape of the interview and some of Mr. Nakasone's entourage also confirmed that the interview had taken place. Mr. Nakasone then tried to mollify the Japanese public by a clarification - he said that what he really had meant to deny was that he had made such statements to President Reagan although he did admit making such statements to the *Post*. By this stage a Nakasone aide was explaining to Western journalists that the *Post* interview was Mr. Nakasone's *hypothesis* of what would happen if the U.S.S.R. attacked Japan.

It was obvious that Mr. Nakasone was caught in a difficult situation. On the international stage he has found it necessary to present himself as a 'hawk'. There are many reasons for this. Firstly, it would seem that Mr. Nakasone does, as an individual, believe that Japan should rearm - as a personal view his *Post* interview was sincere. Secondly, it is very opportune for Mr. Nakasone to present this image internationally because it is a means of deflecting American and EEC criticism of Japan's trade surplus with these countries. Showing that he is willing to try to commit Japan to a programme of rearmament gives him 'leverage' in trade negotiations - leverage with the present Reagan administration in Washington which is under considerable pressure to introduce greater protectionism against Japanese imports. Democrat presidential hopeful Walter Mondale has been campaigning vigorously on this issue with considerable public response - predictably in areas most affected by Japanese imports.

Mr. Nakasone's statements of personal conviction for consumption abroad were given credibility in February when it was announced that Japan had offered to export weapons technology to the United States. This offer was clearly intended to give substance to Mr. Nakasone's views on Japanese defence and to prove to the Reagan administration that *this* Japanese government is willing to make a far greater contribution to joint defence efforts than previous LDP governments.

Once again Mr. Nakasone's international image was in contrast to the image he had presented at home. After all Mr. Nakasone had joined in an unanimous vote of both Houses of the Japanese parliament in 1981 to ban the export of arms-related technology to communist nations or any nation *likely* to become involved in a conflict and that had included the United

States. This had been despite a direct request from the United States for transfer of technology.

Despite this agreement to expedite technology transfer, it was clear that Mr. Nakasone would not necessarily have the full co-operation of his party in this action. In a subcommittee debate in the Lower House of the Japanese parliament Mr. Hiroshi Kitamura, a senior Foreign Ministry official, said when Japan was asked to provide the United States with arms, he was sure that this would only be done *after* Japan had taken "into consideration the situation prevailing at the time". The Minister for Trade and Industry, Mr. Sadanori Yamanaka also said in March that he would stake his "political life on not allowing exports and joint production of arms which kill and injure people". These statements put considerable qualification on Mr. Nakasone's offer of technology transfer.

A Kyodo News Service report in late March also implied that Mr. Nakasone's statement on weapons technology transfer was not even necessarily well received by Japan's small defence industry, and that the Japanese government would not hurry such technology transfer.

"... within industry there are some urging caution in the belief that the real aim of the U.S. in seeking to import Japanese military-related equipment and technology is actually to utilise them also for non-military purposes under the pretext of "military co-operation."

The government has already said that there will be no wholesale transfer of equipment and technology to the U.S. Each American request will be considered on merit and no Japanese private firm will be forced to give up its secrets against its will."

#### Japan's top five defence contractors

	1981	
	Defence sales (millions of dollars*)	Share of total defence spending (%)
Mitsubishi Heavy Industries. . . . .	U.S.\$457.5	13.9%
Kawasaki Heavy Industries . . . . .	262.0	7.9
Mitsubishi Electric. . . . .	254.8	7.7
Ishikawajima-Harima . . . . .	155.0	4.7
Toshiba . . . . .	140.0	4.2

\*U.S. \$1 = 230 yen

Data: Japan Defence Agency

Despite statements of dissent from within his own party, Mr. Nakasone moved in March to get the LDP to review its policies on the export of arms; a crucial move if the small Japanese armaments industry is to move into large scale production. Such production would substantially lower costs to the Japanese Self Defence Forces of much needed equipment. Large scale production and exports would greatly increase the purchasing power of the Japanese Defence budget.

The prospect of a renaissance Japanese armaments industry competing with U.S. arms manufactures has not of course been welcomed by the Americans. Like the Japanese, Americans are

also wary of seeing arms technology transfer returning home as commercial goods. This has particularly been a fear in the aircraft industry.

Nevertheless, Mr. Nakasone has only gained a very reluctant agreement from his cabinet to set the party on the road to reviewing its arms production and export policies. To even get a review was traumatic for the party and the electorate as witnessed by Mr. Yamanaka's laying his political life on the line in opposition to such exports.

What then are the prospects for the revision of long-standing pacifist policies and for a concerted effort by the Japanese government for a greater commitment to taking up a greater share of the defence burden in the northern Pacific? In the opinion of this author there are chances for *only very limited change* - a slow build-up within the constraints of that 1% of GNP limitation to Japanese defence spending. Further, I believe that the much vaunted arms technology transfer will be slow and suspicious on both sides as neither side wants to give away commercial advantage. I also believe that the Japanese Liberal Democratic Party would be quite willing to sacrifice Mr. Nakasone if his personal views on defence and Japanese rearmament substantially alienated an electorate noted for its adherence to Pacifism. In February Mr. Nakasone's ratings in the polls had dropped dramatically. There will be those in the electorate and in his own party who will feel that in his first year as Prime Minister he has spent too much time emphasising his nationalistic, 'hawkish' views before an international audience and not enough time addressing *domestic* economic issues.

To elaborate on these conclusions, I have attached an appendix for those willing to delve into the politics of the Japanese Liberal Democratic Party . . . . .

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## ECONOMIC

### NAKASONE'S RELATIONSHIP WITH BUSINESS CIRCLES DETERIORATES

Tokyo ZAIKAI KORON in Japanese Jun 83 pp 42-45

[Excerpts] The unified local election that attracted attention as the first nationwide election since the beginning of the Nakasone government is now over. And the focus has shifted to whether or not there will be a general election--with the dissolution of the Lower House--with the Upper House election. The view is held by some that a double election of both Upper and Lower Houses on the same day is far off because of the unexpected defeat of conservatism (LDP) in the gubernatorial elections in Hokkaido and Fukuoka, which were regarded as strategic elections. But the trend of the political situation is beyond prediction. However, the criticism that "Nakasone has become unreliable; we can not bear to watch him," has begun to be heard recently among those in business circles whose opinion of Nakasone at the beginning was high beyond expectation--"Nakasone will do very well." Should this be seen as a limitation of a cabinet, which is just a branch of conservatism, about which there was apprehension? Or should it be seen as a "departure from Nakasone" by the business world, which is more of a weathervane than Nakasone and is characteristically quick to seize an opportunity? Let's sum up the post-honeymoon relationship between the Nakasone government and the business world.

#### Desire For Another World

"Prime Minister Nakasone is doing well, isn't he? Nakasone's public reputation is better than what you say."

Eishiro Saito, vice chairman of the Federation of Economic Organizations (Keidanren) and chairman of Nippon Steel Corporation, whose aim is to become the next-generation boss of the business world, used to make this comment to forestall the press corps whenever the results of public opinion polls of various newspapers appeared in which Nakasone's support hovered around 30 percent.

Saito is also chairman of the Japan Project Industry Commission (JAPIC) which the business world set up to overcome the economic slump through large-scale projects. JAPIC is an organization in which 113 major enterprises participate in addition to the associations of 17 industries, such as the Steel Club and the Japan Civil Engineering Industries Association. With the promotion of joint government-private large-scale projects as its axis, JAPIC tries to open up the vitality of the private enterprises and expand domestic demand on



a long-term basis. It has solidified a system promoting projects with the entire business world.

In addition to such projects as the water resource development plan linking the Shinano and Tone rivers, the Tokai area loop urban plan and the Tokyo Bay loop highway plan, such overseas projects as the second Panama Canal plan, the Gibraltar Straits tunnel plan, desert forestation and the Eurasian continental longitudinal road plan are targeted, and these herald the "concept of world reconstruction for the 21st century."

Saito's words gradually became grandiose:

"\$500 billion for world reconstruction; 20 trillion yen. World military expenditures are \$600 billion. It would be better to spend this money for reconstruction than on destroying the earth. Before long, this earth alone will not suffice; another 'earth' will be needed."

On 4 April, JAPIC received approval to incorporate from the Ministry of International Trade and Industry (MITI) and the Ministry of Construction. The one who showed much interest in this matter was none other than Prime Minister Nakasone. As seen from the fact that Saito is chairman of JAPIC and the vice chairman is Rokuro Ishikawa of Kajima Corporation, it is clear that the aim is the expansion of the steel market and an increase in construction work, no matter how fair-sounding their comments.

At any rate, when the Upper House election, following the unified local elections, and the dissolution of the Lower House are looked at, no matter how much money there is, it will not suffice. It is said that the political contributions that the LDP requested from the business world for the 1983 political battle were 10 billion yen. How much the business world will cooperate in gathering up funds is a matter of concern for Prime Minister Nakasone.

The number of enterprises that has undergone executive compensation and managerial salary cuts, starting with Nippon Steel, has increased because the economic slump was prolonged.

#### No Unfairness

It is true that impressive actions by Nakasone were enough to win the appraisal of the business world--such actions as setting out to normalize Japanese-Korean relations by flying to Seoul immediately after assuming the office of prime minister; putting together the 1983 budget within the year, when it seemed inevitable that the budget preparations would last into next year; and visiting Washington without delay. Even though he made a series of speeches which became the inevitable victim of the mass media since he set forth a dangerous line of military expansion, such as "unsinkable carrier" and "blockade of the straits," it was stated: "it is admirable that he spoke so courageously as a responsible government official." (Yoshihiro Inayama, chairman of Keidanren) But then, the notables in the business world are also hawks.

At any rate, Shigeo Nagano, head of the Japan Chamber of Commerce and Industry, is an advocate of lifting the ban on arms exports; and Hosai Hyuga, chairman of

Sumitomo Metal Industries, Ltd., who is chairman of the Kansai Keidan-ren, is a well-known advocate of military conscription. It was natural for them to applaud Nakasone with the statement, "he has spoken well," agreeing with the ideas in Prime Minister Nakasone's hawkish defense arguments.

Hiroki Imazato, a consultant with Nippon Seiko, K.K., who is sensitive to the direction of currents in the business world, was so charmed by Nakasone that he declared: "A 30-percent support ratio for Nakasone is sufficient. Without a doubt, the Nakasone government will continue for 4 years, two terms."

Imazato, who acknowledges himself to be the messenger boy of the business world, worked with Shigeo Nagano and Kyonosuke Ibe, chairman of the Sumitomo Bank, Ltd. and reorganized an association of businessmen around Prime Minister Nakasone. They created the "Seiko-kai."

It may be said that the business world's ties with Prime Minister Nakasone are weaker than those with the mainstream factions because his faction is but a branch of conservatism. However, whether the ties grow thin or weaken he is an influential leader who commands his own troops.

Various associations, such as the "Koki-kai," which was set up when Nakasone was chairman of the LDP Executive Council under the Sato government, the "Akebo-no-kai," "Nanzan-kai," "Nakai-kai" and "Hoyu-kai" were in good order and were the pipeline for funds for Nakasone himself and his faction.

There are some differences among these associations. Nagano, Imazato, Hiroshi Anzai, chairman of Tokyo Gas Co., Ltd., and Masami Iwasa, consultant for The Fuji Bank, Ltd., are the organizers of the Koki-kai. The Koki-kai has many senior businessmen, such as Toshio Tsuchimitsu, honorary chairman of Keidan-ren. In contrast to this, the Akebo-no-kai has a long list of influential executives, as can be seen from the list of organizers, such as Imazato, Toshikumi Yahiro, president of Mitsui and Co., Ltd., Otokazu Nakada, chairman of Mitsubishi Estate Co., Ltd., Gaishi Hiraiwa, president of Tokyo Electric Power Co., Ltd. and Akio Morita, chairman of Sony Corporation. And as for the Nanzan-kai, the organizers are Rokuro Ishikawa and Jiro Ushio, president of Ushio, Inc. There are many younger businessmen in the Nanzan-kai.

There are some who have joined several associations. Naturally this is not to say that these businessmen hold meetings only with Nakasone. They hold similar meetings with the commanders of the other factions. Nakasone himself has been active in these meetings with the businessmen since he took over the government. In addition to the fact that the busy prime minister would have trouble attending the meetings of the existing associations, it was thought that it would be better if there was a lessening of the impression of a close-knit union between the prime minister and the business world. Therefore, there was this reorganization, with a consolidation of these associations.

Of course, the "ko" in Seiko-kai was taken from the character "yasu" ("ko" is another reading of the character "yasu") in the name Yasuhiro Nakasone. The businessmen's meetings with former prime minister Suzuki were called the

"Seirei-kai." Sticking to the "sei" (which means "pure") in Seiko-kai is questionable; it can be said that the relationship of politics and business shows how much the pollution level of financial influence has advanced. At any rate, Nakasone is the present prime minister.

Whether a businessman is a member of the gathering or not is tied to the person's position in the business world and the image of his enterprise. Therefore, membership has come from a mixture of self-recommendation and recommendation by others. Even though the existing associations became the core of the reorganized association, the senior members of those associations were excluded. And for the sake of balance, representatives joined not only from Tokyo but also from the Kansai, Chukyo and Kyushu business circles. Sixty-five members were selected as shown in the membership list.

Imazato explained the selection process as follows: "We were careful not to have an imbalance."

#### Loss Leader of the Return to Prosperity

However, in contradiction to the speculation of Imazato and the others, the individual meetings have continued just as they were. Yoshizo Ikeda, a consultant with Mitsui and Co., Ltd., explained this situation as follows: "Important discussions should not be held with great fanfare." It is almost certain that thoughtful consideration was given for those who were unable to join the Seiko-kai.

The first meeting of the Seiko-kai, which was inaugurated with 65 representatives from the entire business world, was held at the Hotel New Otani in Kioicho, Tokyo, on 31 March, beginning at 6:30 pm. But with only 42 in attendance, the attendance rate was 65 percent. Considering the fact that it began with great fanfare, those absent were conspicuous.

It was the desire of the businessmen to have the first meeting in a relaxed atmosphere. There were no reserved places and each sat wherever he wanted, with Prime Minister Nakasone at the center. Nagano, who sat directly across from the prime minister, stood to give the greeting as the representative of the organizers. After explaining the purpose of the meeting, he encouraged Nakasone in the following way: "Until one becomes prime minister, it is normal to be changeable; it is perfectly alright to be a weathervane. Since the future holds victory or defeat, now we want you to hold firm."

Prime Minister Nakasone seems to be confident of himself in politics and foreign affairs, but he acknowledges that he is tone deaf when it comes to economics. Nakasone touched the pride of the businessmen at the meeting when he said: "I myself do not understand the fine workings of economics, but I am quite confident that my intuition is sharp. I would like to have your advice."

Goro Koyama, consultant for Mitsui Bank, Ltd., who is especially close to Nakasone because of his relationship as an upperclassman at Shizuoka High School under the former education system, said with great delight: "He

emphasized the use of his brains to make the best possible use of the vitality of the private sector. I was relieved." The first meeting ended after 1 hour and 50 minutes. The opinion of those in attendance was good, and they made arrangements to have meetings once a month.

Afterwards, on 5 April, business countermeasures, which can be seen clearly as election countermeasures, were set forth. And the loss leader was the promotion of home construction through the relaxation of building standards. This was even mentioned by the prime minister at the first meeting of the Seiko-kai. At that time, the prime minister stated: "When I lived in Meiji-iro, I tried to build a third floor onto my small home, but I could not do so because of regulations. At least I want to make it possible to have five-story buildings within the loop of Route 7. And I want to make the best possible use of the wisdom of the private sector." He quickly set this forth as a business countermeasure.

Since the demand for regulatory relief had already grown strong, this was greatly welcomed by the real estate industry, which has land and buildings that it is unable to sell because of the prolongation of the economic slump. Of course, election funds can be expected in return for this. It is said that when Konosuke Matsushita met with the prime minister at the end of March, he deeply impressed Nakasone with his statement: "Money is an indispensable part of politics. Ask for it openly." Every enterprise has tightened its purse strings because of the prolonged slump. In fact, enterprises are raising a howl at the large contribution allocation to the LDP and at the aggressive sale of tickets to parties for the various factions and individual legislators. There exists a give-and-take relationship between the LDP and the business world, given the fact that the LDP would like to do nearly everything if it could get the money.

But ironically, at almost the same time as the start of the Seiko-kai, a little more than 4 months after the birth of the Nakasone government, the end of the honeymoon period with the business world seems to have been proclaimed. This was demonstrated by the disgusted looks on the faces of notable leaders in the business world when the conservative camp was defeated in the gubernatorial elections in both Hokkaido and Fukuoka.

Shigeo Nagano did not conceal his shock, saying: "It is a serious matter simply because public interest was raised." And with a reverse swipe, he made a special request that "if the LDP was defeated in the gubernatorial elections because of factional strife and negligence, then we want the LDP to brace itself and put its efforts into the next election." Bumpei Otsuki, chairman of the Japan Federation of Employers Association (Nikkei-ren), said: "It is necessary for the LDP to examine itself in humility in terms of such aspects as its future political posture." And Nao Sasaki, secretary of the Japan Committee for Economic Development, gave candid advice: "We want you to humbly accept the results and deal with the management of the government from this point on."

Chairman Inayama of the Keidan-ren pretended to remain calm, stating: "A local gubernatorial election is a problem for the individual and not criticism against the system of liberalism. The candidate in Hokkaido had a good



reputation and was well known. The Fukuoka candidate miscalculated his fifth election and it was easy for the reform faction to open its attack." However, Jihachiro Hanamura, vice chairman of Keidan-ren, who is a native of Fukuoka, could not help but give a sour smile when the press corps pointed out that he had been very optimistic before the election when he said: "Various criticisms has been leveled against Governor Kamei, but the gorgeous mansion valued at 500 million yen is for the future governor, and the reason he took geisha to Hawaii was to introduce the arts of Japan. It seems he will win somehow."

At the first meeting of the Seiko-kei, Nagano stated quite aptly that "don't worry about being a weathervane." But in fact, the business world is more of a weathervane than Nakasone. While someone concurs with their interests, they give great attention and flatter that person.

The misgivings about Nakasone were pointed out by Noboru Goto, president of Tokyo Electric Express Railway, Ltd., an old friend of Nakasone. "Just like watching one's favorite sumo wrestler in the ring, a person is always nervous about whether the wrestler will fall or put his foot outside the ring."

Once you start buttoning your shirt wrong, you are apt to cause subsequent inconsistencies. There is growing private and government criticism of Nakasone's industrial policies in the United States. And Chairman Inayama of Keidan-ren criticized the Japanese Government's attitude. "Each country has its industrial policy. Our government's way of investing in industry is a problem, but Japan's industry is not protected as much as has been said in the United States. This talk is incongruous, since the Japanese Government has lacked firmness on this issue. I want the government to be more resolute."

Pressure against Japan has intensified not only in America but also in Europe, centered on the issue of trade friction. In such times, both the government and the business world must be united and deal with the issue. But there is the worry that the situation under the Nakasone government is gradually going in the opposite direction.

#### Membership List of Seiko-kai

Yoshishige Ashihara, chairman, Kansai Electric Power Co., Inc. \*\*  
Takeo Atsumi, chairman, Kajima Corporation  
Hiroshi Anzai, chairman, Tokyo Gas Co., Ltd.  
Kisaburo Ikeura, president, Industrial Bank of Japan, Ltd.  
Takashi Ishihara, president, Nissan Motor Co., Ltd.  
Keisuke Idemitsu, director and consultant, Idemitsu Kosan Co., Ltd.  
Yoshihiro Inayama, director and consultant, Nippon Steel Corporation \*\*  
Kyonosuke Ibe, chairman, Sumitomo Bank, Ltd. \*\*  
Hiroki Imazata, consultant, Nippon Seiko, K.K. \*\*  
Masami Iwasa, consultant, Fuji Bank, Ltd.  
Kazuo Iwata, chairman, Toshiba Corporation  
Hisamitsu Uetani, chairman, Yamaichi Securities Co., Ltd.  
Hideo Edo, chairman, Mitsui Real Estate Development Co., Ltd.  
Bumpei Otsuki, chairman, Mitsubishi Mining and Cement Co., Ltd. \*\*

Yoshiro Obayashi, president, Ohbayashi-Gumi, Ltd.  
 Ryoichi Kawai, chairman, Komatsu, Ltd.  
 Shojiro Kikuchi, chairman, Nippon Yusen, K.K.  
 Kiichiro Kitaura, director and consultant, Nomura Securities Co., Ltd.  
 Koji Kobayashi, chairman, Nippon Electric Co., Ltd.  
 Goro Koyama, director and consultant, Mitsui Bank, Ltd. \*\*  
 Noboru Goto, president, Tokyo Corporation \*\*  
 Eishiro Saito, chairman, Nippon Steel Corporation  
 Takeshi Sakurada, consultant, Nisshin Spinning Co., Ltd.  
 Nao Sasaki, secretary, Japan Committee for Economic Development \*\*  
 Keizo Saji, president, Suntory Distillers, Ltd.  
 Kinji Sato, president, Sato Kogyo Co., Ltd.  
 Yukio Shibayama, chairman, Sumitomo Corporation  
 Sadakazu Shindo, chairman, Mitsubishi Electric Corporation  
 Seiji Suzuki, president, Mitsubishi Chemical Industries, Ltd.  
 Haruo Suzuki, chairman, Showa Denko, K.K.  
 Kotaro Takeda, chairman, Nagoya Railroad Co., Ltd.  
 Yasuoki Takeuchi, president, Nippon Oil Co., Ltd.  
 Seichi Tanaka, president, Chubu Electric Co., Ltd.  
 Fumio Tanaka, chairman, Oji Paper Co., Ltd.  
 Yoshitoki Chino, chairman, Daiwa Securities Co., Ltd.  
 Seiji Tsutsumi, chairman, Seibu Department Stores  
 Yoshiaki Tsutsumi, president, Seibu Railway Co., Ltd.  
 Seiki Tozaki, president, C. Itoh and Co., Ltd.  
 Eiji Toyoda, chairman, Toyota Motor Corporation  
 Norihiko Nagai, chairman, Mitsui O.S.K. Lines, Ltd.  
 Saburo Nagakura, president, Kyushu Electric Power Co., Ltd.  
 Otokazu Nakada, chairman, Mitsubishi Estate Co., Ltd.  
 Shinjiro Nakabe, vice president, Taiyo Fishery Co., Ltd.  
 Toshio Nakamura, chairman, Mitsubishi Bank, Ltd.  
 Motohei Nakayama, chairman, Chuto Kyoryoko Center  
 Shigeo Nagano, director and consultant, Nippon Steel Corporation \*\*  
 Kiichi Noji, chairman, Shimizu Construction Co., Ltd.  
 Norishige Hasegawa, chairman, Sumitomo Chemical Co., Ltd.  
 Hosai Hyuga, chairman, Sumitomo Metal Industries, Ltd. \*\*  
 Gaishi Hiraiwa, president, Tokyo Electric Power Co., Ltd.  
 Kinzo Matsuo, consultant, Nippon Kokan, K.K.  
 Taiichiro Matsuo, chairman, Marubeni Corporation  
 Takuji Matsuzawa, chairman, Fuji Bank, Ltd.  
 Hisami Matsuzono, president, Yakult Honsha Co., Ltd.  
 Yohei Mimura, president, Mitsubishi Corporation  
 Kagayaki Miyazaki, president, Asahi Chemical Industry Co., Ltd.  
 Akio Morita, chairman, Sony Corporation  
 Gakuji Moriya, consultant, Mitsubishi Heavy Industries, Ltd.  
 Yoshizo Yasui, consultant, Toray Industries, Inc.  
 Toshikuni Yahiro, president, Mitsui and Co., Ltd.  
 Isamu Yamashita, chairman, Mitsui Engineering and Shipbuilding Co., Ltd.  
 Toshihiko Yamashita, president, Matsushita Electric Industrial Co., Ltd.  
 Hirokichi Yoshiyama, chairman, Hitachi, Ltd.  
 Shogo Watanabe, chairman, Nikko Securities Co., Ltd.

(Listed in Japanese phonetic alphabetical order. Double asterisk (\*\*)) indicates organizer.)

## ECONOMIC

### REALITIES OF FORMER GOVERNMENT EMPLOYEES REPORTED

#### Double-Dipping Continues

Tokyo JITSUGYOKAI in Japanese 15 May 83 pp 39-41

[Article: "'Double-Dipping Paradise' Rubs Against Common People's Feelings"--NOTE: There are apparently two Double-Dipping White Papers. One was issued on 30 March 1983 by the National Personnel Authority and another, by the Council of Governmental Special Corporation Employees on 5 April 1983.]

[Excerpts] The recent "Double-Dipping White Paper" compiled by the Council of Governmental Special Corporation Employees clearly shows the actual status of "paradise of government employees." Each government office has secured its own "hereditary" territories [in the private sector] so that posts of executives, directors, managers and the like await double-dipping government officials.

The average retirement allowance for double-dipping executives with an average of 4 1/3 years of service is said to be as high as 13.9 million yen, a sum that defies the imagination of ordinary white collar workers in private industry. It has also been said that as many as 151 former government officials employed in 64 corporations are known to have served in more than two governmental special corporations. These "migratory" executives receive even larger retirement benefits.

Both the Adhoc Council on Administrative Reforms, which emphatically appealed for administrative reorganization and cuts in personnel, and the government, which agreed to it, do not seem to be involved seriously in reorganizing the "paradise for double-dipping government employees." The losers are always the people, from whom taxes are extorted. Reading the "Double-Dipping White Paper," which has the subtitle "the Status of Double-Dipping Bureaucrats in Government-Related Agencies," one finds incredulous data on the present status of the "double-dipping paradise."

The report takes up several problems that have surfaced as a result of "double-dipping." These include 1) the present "double-dipping" in the Pension Welfare Service Public Corp which has been transformed into a "colony" of the Social Insurance Agency; 2) the officials and bureaucrats of



MITI, Ministry of Finance, and Ministry of Transport who have exploited Nihon Airplane Manufacturing Co (disbanded last September); 3) the confrontation within the Japan Regional Development Corp between the officials transferred from governmental ministries and agencies (National Land Agency, Ministry of Construction, and MITI) and the original employees of the corp. In addition, the report contains the minutes of a Diet question-and-answer session on "double-dipping" and a structural analysis of high-ranking government officials' double-dipping in the case of the Ministry of Agriculture, Forestry and Fisheries. Although the report presses hard on these and other specific problems, the highlight of the report necessarily centers on problems of large retirement allowances and "migratory officials."

First, the problem of large retirement allowances. Currently, the executives' salaries of governmental finance and public corporations are 1.12 million yen plus for presidents and chairmen, 920,000 yen plus for vice presidents and vice chairmen, and 770,000 yen plus for directors. Since double-dipping high-ranking bureaucrats are, without exception, appointed to executive posts, one can conclude that they receive considerably high salaries. The question here is the manner in which retirement allowances are computed.

#### Retirement Allowance of 30 Million Yen for Less Than 10 Years' Service

The retirement allowance of employees of a governmental special corporation is computed on the basis of 1 month's salary per year of service (within 5 years of continuous service). For example, when an employee with a salary of 200,000 yen retires after 4 years, his retirement allowance would be 800,000 yen based on "200,000 yen x 4 months." In the case of an executive, however, the basis of computation is the number of months in service times 0.36. When an executive whose monthly salary is 1 million yen retires after 4 years of service, his retirement allowance would be "1 million yen x 48 months x 0.36" or 17.28 million yen. If this is to be computed using the method for ordinary employees, it would be "1 million yen x 4 months," a retirement allowance of 4 million yen will do.

In other words, since the computation method for executives is far more advantageous than that for ordinary employees, their retirement allowances become inordinately large. What is curious is the "0.36 x months of service" computation basis, but even this [i.e., 0.36] represents a figure that was lowered in 1978 as a result of [public] criticism against high retirement allowances. Since the factor had been previously set at 0.45, it was the double-dipping executives who were laughing all the way to the bank.

Table 1 lists the top 10 retirement allowances of governmental special corporation executives who retired last year (estimated by the Council of Governmental Special Corporation Employees). At the top of the list is Saburo Yamamoto who served as the president of the Water Resources Development Public Corp and received about 40 million yen. Chairman Koichi Takabayashi and Director Eiichi Yamazoe of Keihin Port Development Authority, which was abolished last year, received about 30 million yen each. Those who appear on the top 10 list are in their sixties and have served about 7 to 9 years. And yet, they received retirement allowances of 20 to

30 million yen--an easy gain, to say the least. In the case of Mr Yamamoto, who is at the top of the list, his retirement allowance after 8 years is about 40 times his salary; an ordinary employee with same number of years of service would receive about 9 times as much as his salary. The executives are treated too favorably.

Among active executives, many qualify for high retirement allowances. The Council of Governmental Special Corporation Employees estimated that the following will receive more than 30 million yen in retirement allowances: Keiki Owada, chairman of the Agricultural Land Development Public Corp; Sadanori Sakata, executive director of the World Economic Information Service; Matsuo Murayama, chairman of the Japan Scholarship Foundation; Ichiro Yoshikuni, president of the Japan Regional Development Corp; Shoichi Fukuda, chairman of the Forest Development Corp; Kenji Watanabe, chairman of the Smaller Enterprise Retirement Allowance Mutual Aid Project Corp.

The problem of escalating retirement allowances lies in the method of computing benefits, but it is also true that a 1977 cabinet decision that would have limited the number of service years to 6 years (8 years for presidents) and their retirement age to 65 (70 for presidents) has yet to be enforced. For instance, Chairman Owada of the Agricultural Land Development Public Corp has already served three terms, a total of 9 years.

#### Cabinet Decision to Prohibit "Migratory Officials" Ignored

The practice of officials migrating from one position to another continues as ever. The understanding arrived at the cabinet meeting of December 1979 states that "exceptions to reshuffling of officials between governmental special corporations (which, as a rule, should not be practiced), should be limited to truly unavoidable cases, and even then to only one reshuffle."

According to the Council of Governmental Special Corporation Employees, however, there were, as of last October, 151 so-called "migratory officials" (from public profit organizations and private corporations to governmental corporations and vice versa). Of these, 61 officials can be faulted under the cabinet understanding [of 1979]. Moreover, there were 10 executives who had held 3 positions and one had held 4 positions. Both the cabinet decision and the agreement have been completely ignored.

What the Council sees as problematic is this: previously, any change in position (for example, from vice president to president) within a single corporation was treated as a change between two different corporations, with the retirement allowance coming at the time of change. Recently, however, in order to avoid criticisms such as "buck-passing officials" or "migratory officials," such changes have been handled as "continuations." Any changes accompanying consolidation or reorganization of governmental special corporations are treated similarly. The council is critical of such a practice, claiming that it is an attempt to "conceal migratory officials."

Retirement allowances for "migratory executives," as in the case of double-dipping bureaucrats who remain long at one corporation, have also become

exceptionally high. Table 2 shows representative migratory executives who retired last year. Although both Tadao Kobayashi, former president of the Housing and Urban Redevelopment Corp and Masaru Usami, former president of Tohoku Development, did not receive outrageous retirement allowances (nothing negligible by any means) at each change in post, their combined allowances exceeded 30 million yen each. Each received 30 million yen in retirement allowances for about 10 years of migratory service. What luxury!

Present examples of migratory officials include Seichi Shimura, president of the Housing and Urban Redevelopment Corp, who is serving in his fourth post beginning with the presidency of the Industrial Relocation Areas Promotion Corp. His retirement allowance has reached more than 46 million yen. Tetsuya Nanbu, president of the Danchi Service (a subsidiary of the Housing and Urban Redevelopment Corp) is also on his fourth post and his retirement allowance has exceeded 60 million yen.

One may choose to receive a large retirement allowance by staying long with a single governmental special corporation or one may accumulate large sums by serving several corporations. What is common to both is the fact that those who can collect high retirement allowances are limited to high-ranking bureaucrats who have served as undersecretaries or directors at various ministries. The rights and profits of high-ranking bureaucrats are securely structured into the governmental special corporations picture. This explains why there have been no cuts in the number of executives in these corporations and why the practice of double-dipping has not been corrected. There is some logic to the argument that "those who have climbed to executive posts in governmental offices have thorough knowledge of the work of its affiliated governmental special corporations, and are, therefore, indispensable." Nevertheless, the Japanese people in general would feel that government officials are treated too favorably.

(1) 表1 退職役員の退職金取得額 (政労協試算)

(2) 順位	(3) 法人名	(4) 役職名	(5) 氏名	(6) 年齢	(7) 在職期間	(8) 退職金 (試算額)
1	(9) 首都圏開発公社	代表取締役 (10)	山本 (11) 三郎	73	96ヵ月	40,380,400円
2	(14) 日本外資銀行公社	代表取締役 (15)	高橋 (16) 一	62	78 "	30,537,000
3	(19) "	代表取締役 (17)	山崎 (18) 一	66	100 "	30,150,000
4	(21) 日本学校健康会	代表取締役 (22)	長谷川 (23) 三	61	97 "	27,992,200
5	(24) 日本学校健康会	代表取締役 (25)	納言 (26) 三郎	62	86 "	27,725,040
6	(26) 日本外資銀行公社	代表取締役 (27)	丸山 (28) 人	62	96 "	27,541,800
7	(29) 日本外資銀行公社	代表取締役 (30)	船橋 (31) 三郎	58	78 "	27,202,500
8	(33) 日本外資銀行公社	代表取締役 (34)	大塚 (35) 男	66	98 "	25,392,000
9	(36) 日本外資銀行公社	代表取締役 (37)	田中 (38) 三郎	60	97 "	25,310,900
10	(39) 日本外資銀行公社	代表取締役 (40)	福井 (41) 三郎	59	87 "	23,734,800

Key:

1. Table 1. The Amount of Retired Executives' Retirement Allowances (estimated by Council of Governmental Special Corporation Employees)

[Key continued on following page]

2. Ranking
3. Corporation
4. Post
5. Name
6. Age
7. Period of service
8. Retirement Allowance (estimate)
9. Water Resources Development Public Corp
10. President
11. Saburo Yamamoto
12. Months
13. Yen
14. Keihin Port Development Authority
15. Chairman
16. Koichi Takabayashi
17. Director
18. Eiichi Yamazoe
19. Japan School Health Association
20. Keizo Shibuya
21. Japan Information Center of Science and Technology
22. Managing Director
23. Siro Narabayashi
24. Japan Regional Development Corp
25. Hideto Maruyama
26. Vice chairman
27. Toshimichi Funabashi
28. Danchi Service
29. Managing director
30. Kikuo Owawa
31. Japan Institute of Labor
32. Junichiro Tazawa
33. Environmental Pollution Control Service Corp
34. Tsutomu Fukuda

(1)表② わたり鳥 (退職者) の代表例 (政府協同会)

(2) 氏 名	(3) 年 齢	(4) 経 歴	(5) 在職期間	(6) 退職金 (試算)	(7) 退職金 (試算)
(8) 小林 忠雄	62	(9) 建設省首都圏整備委員会事務局長 日本住宅公団理事 (10) 阪神高速道路公団副理事長 (13) 市地開発公団副総裁 (14) 住宅・都市整備公団副総裁 (15) 市地開発公団副総裁 (16) 不動産研究所 (17)	(11) 11ヵ月 27 " 1,002 48 " 1,337 13 " 400 " (18) (予定) (18)	(12) 275万円 1,002 1,337 400 3,014万円	
(19) 宇佐 浩	62	(21) 大蔵省証券局長 (20) 住友銀行・住友信託銀行理事 市地開発公団副理事長 (22) 住友中央金庫専務理事 (23) 東北開発総裁 (24)	(11) 61ヵ月 14 " 397 35 " " 4 48 " 1,154	(12) 1,612 397 3,463万円 + "	

Key:

1. Table 2. Representative Examples of Migratory (Retired) Officials (Council of Governmental Special Corporation Employees)
2. Name
3. Age
4. Experience
5. Period of service
6. Amount of retirement allowance (estimate)
7. Total amount of retirement allowance (estimate)
8. Tadao Kobayashi
9. Director of the National Capital Region Redevelopment Commissions, Ministry of Construction
10. Director of Nihon Housing Corp

11. Months
12. 10,000 yen
13. Vice chairman of Hanshin Superhighway Corp
14. Vice president of Housing Land Development Corp
15. Vice president of Housing and Urban Redevelopment Corp
16. Adviser
17. Real Estate Research Center
18. (anticipated)
19. Masaru Usami
20. Director of Mint Bureau, Ministry of Finance
21. Director of Power Reactor and Nuclear Fuel Development Corp
22. Vice chairman of Agricultural Land Development Public Corp
23. Executive director of Central Cooperative Bank for Agriculture and Forestry
24. President of Tohoku District Development

#### Former Government Employee Paradise

Tokyo SANGYO TO KEIZAI in Japanese May 83 pp 43-47

[Article: "Government Employees Are Closely Watched"]

[Text] According to the 1982 "Double-Dipping White Paper," published in the end of March by the National Personnel Authority, a total of 268 high-ranking government officials were reemployed by private corporations which have close ties with government offices in which these officials once served. This year's total exceeds the previous high, recorded in 1981, by 17.

The record was broken at a time when there is much public support for administrative reorganization in the government. What is unique about this year's double-dipping phenomenon is that bureaucrats, anticipating public criticism, are doing their best to defend themselves.

According to the white paper, 37,747 civil servants retired in 1981. A total of 267 (or 8.6 percent) of 3,106 ministry and agency officials at the section-manager level and above, the subject of this year's white paper, found reemployment in private industries.

In explaining the record high increase in double-dipping employment, the report first emphasizes the fact that ministries and agencies in preparation for the introduction of a [mandatory] retirement age system in the fiscal year 1985, had encouraged their senior officials to retire early. This move was also in response to public demand for "fewer public officials."

The report also states that not all cases of double-dipping by high-ranking officials were accepted point blank, but that there were in fact four cases which the National Personnel Authority judged inappropriate and in which it sought dismissal.

Furthermore, among those who were reemployed in private sectors, 65 were hired in executive capacities, a decrease of 13 from the previous year. Only



five who held directorship posts or above at the ministries and agencies entered private industries (six, the previous year). The report is rather vociferous in citing figures as proof that the government is taking the initiative to check the practice of double-dipping.

The reason for these government counterarguments lies in the increasing public criticism against the "ways" of civil servants, at a time when the demand for administrative reorganization is rising.

#### Large Retirement Allowances for Migrating Officials

The government had already introduced regulations governing double-dipping in the form of the cabinet "decision" of December 1977 and the cabinet "understanding" of 1979. These include: 1) in order to increase nongovernmental personnel in governmental special corporations, one-half of all full-time officials should be comprised of private individuals; 2) the number of reshufflings (migration of officials) between governmental special corporations should be limited to one, even under situations requiring more than one; 3) period of service, as a rule, should be limited to 6 years, 8 years for presidents; 4) as a rule, retirement age should be set at 65, 70 for presidents.

In addition [to these regulations], the Second Interim Administrative Investigation Council, in its first reply of July 1981 and, again, in the final reply of March 1982, has advised that "the number of executives in a governmental special corporation should be reduced 20 percent by 1984 and the appointments and dismissals should be made in strict observance of the cabinet decision." This, too, is a source of headache [for the government].

Because of this, the government responded favorably to the section in the report which read, "of the 762 executives now employed by all governmental special corporations, double-dipping former government officials, as of 1 July 1982, numbered 539 or 70.7 percent of the total. This is slightly lower than 1981, when 546 or 71 percent of 766 were 'double-dippers.'"

Furthermore, the government's own survey shows that, "taking 452 as the figure for former government employees now among the 763 executives in governmental special corporations, the percentage drops down to 55.7 percent." This, however, is merely a result of a convenient interpretation that "those who have served in private corporations for more than 5 years are no longer regarded as double-dippers." The actual situation is that the practice of "migration" still continues and there appears to be no end to it.

As mentioned above, the cuts in executive personnel in governmental special corporations were to have been by 10 percent by the end of March 1983 and 20 percent by the end of fiscal year 1984. The results show that 26 persons, or 7.3 percent of all executives in 50 corporations, were cut by the end of October last year. But cuts in nongovernmental personnel were more severe than in double-dipping executives, for nearly twice as many of them were cut. It would seem that what is termed as a paradise for high-ranking government

employees is still oblivious to demands of administrative reorganization and to recession.

The practice of "migrating officials" is still as intense as ever and we need not wait for the report of the Council of Governmental Special Corporation Employees to see it.

For example, Tadao Kobayashi (age 67), who retired as a counsel to the Housing and Urban Redevelopment Public Corp last October, had held four other double-dipping posts. The post-retirement career began in October 1974, when he retired as a director of the National Capital Region Redevelopment Commission of the Ministry of Construction and became a director of the Japan Housing Corp. Thereafter he was an assistant director of the Hanshin Superhighway Corp, a vice president of the Housing Land Development Public Corp, and a vice president of the Housing and Urban Redevelopment Public Corp. It is said that he collected a total of 30.14 million yen in retirement allowance and then joined the Real Estate Research Center.

Masaru Usami (age 62), who last June retired as president of the Tohoku District Development, also went from one corporation to another; after retiring from the directorship of the Mint Bureau of the Ministry of Finance. His postgovernment career began as a director of the Power Reactor and Nuclear Fuel Development Corp and moved on to become a vice chairman of the Agricultural Land Development Public Corp, a managing director of the Central Cooperative Bank of Agriculture and Forestry, and the president of the Tohoku District Development. He is said to have collected more than 34.63 million yen in retirement allowance.

To combat such huge retirement allowances, it is true that payment rate was cut down from 0.45 to 0.3 in 1978. But there are loopholes, for it is said that "in the case of retiring presidents, the rate of 0.45 is applicable as their vested right." Administrative reorganization does not mean anything [to government officials]. But no hysterical criticism will improve the situation.

For example, we are living in an age when even a regional government employee can retire with 30 to 40 million yen for 30 or more years of service. The fact that benefits for government employees are more favorable than those given in private industry has become clear with the fact of today's slow economic growth. This means that prompt and speedy cuts in personnel, a management method used by private industries, are urgently needed in government offices.

The 8 April issue of ASAHI SHIMBUN, in the editorial "How to Change the Government Employee Paradise" made the following suggestion: "Undersecretaries and directors of ministries and agencies customarily resign en masse in their early fifties. It is about time for this practice to be reconsidered. With the arrival of an aging society private industries are adopting a retirement age of 60. It is odd that government alone does not require the services of middle age and senior employees. If government



employees are allowed to spend their working years as civil servants and have no worries about life after retirement, they can serve with more ease."

This suggestion is reasonable but it may create an excuse for withered old officials to linger longer in governmental special corporations. What is desirable is a reduction in the number of government employees and, even if this is not accomplished, there must be a change in the free and easy-going work habits of bureaucrats, an increase in productivity, and an end to a life of merely collecting retirement allowances. Otherwise we cannot help but warn that antitax movements will rise among the Japanese people.

#### The Tanaka Faction Among Former Officials of Ministry of Finance

As far as top-class, active bureaucrats are concerned, it must be said that public criticism against high-ranking government officials is off the mark.

Among the double-dipping "migratory officials," Osamu Hashiguchi, a former official of the Ministry of Finance, has been the center of much talk. This is because in late December 1982 he was appointed to the post of special adviser to the Federation of Bankers Associations of Japan after serving as the chairman of the Fair Trade Commission.

Mr Hashiguchi was born in 1921 and is 61 years old. In 1943, after graduating from the Law Department of Tokyo University, he entered the Ministry of Finance. Early in his career he cultivated [his talents] in the "field of banking." He was manager of the Banking Bureau's Small and Medium Finance Section, its Special Finance Section, and manager of the Banking Section.

Later he served as chief of the Tokyo Customhouse, deputy chief of the Budget Bureau, director of the Financial Bureau, director of the Budget Bureau, and finally as the first undersecretary of the National Land Agency.

He stayed in this last post until he retired in September 1977 and, after retirement, served for 5 years or so as the chairman of the Fair Trade Commission. While at the commission, he conducted the first extensive investigation of the distribution industry and became well-known for taking up the case of the Mitsukoshi Department Store's ill-treatment of its suppliers. But what has attracted public attention is his recent appointment to the Federation of Bankers Association. Traditionally, such appointments go to double-dippers from the Bank of Japan. For example, Taizo Hoshino, a former director of the Bank of Japan, is currently the vice chairman of the federation and his predecessor, Shigeo Matsumoto, was also a former director of the Bank of Japan.

The banking industry at present needs a more powerful political base due to entangled territorial problems with the securities industry, involving, for example, the sale of national bonds. [Hashiguchi's appointment] is seen as an attempt by the banking industry to bring in a powerful former official from the Ministry of Finance so as to strengthen its voice in the finance industry.

Each year the battle has intensified between the Ministry of Finance and the Bank of Japan over double-dipping positions in private industries. It would seem that with the appointment of Mr Hashiguchi, the Ministry of Finance has expanded its territory. Previously it was former officials of the Ministry of Finance who were appointed to the post of president of Bank of Japan. [The Hashiguchi appointment] can be regarded as a beginning of a "rollback" by the Ministry of Finance which had lost its hold on the bank's presidency to the insiders within the bank. This was due in part to the power struggle between [former Prime Ministers] Kakuei Tanaka and Takeo Fukuda.

Hajime Takahashi, former undersecretary of the Ministry of Finance, became the chairman of the Fair Trade Commission, vacated by Osamu Hashiguchi.

Born in 1925, Mr Takahashi is 57 years old. In 1949, he entered the Ministry of Finance after graduating from the Law Department of Tokyo University. After the Banking Bureau, where he began his career in the ministry, he became the Section Chief of the Cabinet Secretariat Document Section in 1972, chief "secretary of Economic Planning Agency in 1977, Tax Bureau Director in 1978 and undersecretary of the ministry in 1981.

In July 1962, Kakuei Tanaka was appointed Minister of Finance in the second Ikeda cabinet. Hajime Takahashi was his private secretary.

Fumio Takagi, the present president of the Japanese National Railways, was then the secretary to the office of the Finance Minister.

Among the alumni of the Ministry of Finance, these are the well-known members of the Tanaka faction.

The following Diet members comprise the core of the Tanaka faction, all former officials of the Ministry of Finance: Mototoshi Yamashita (member since 1943), formerly of the Hiroshima Tax Bureau and elected to the House of Representatives; Joji Fukushima (member since 1948), former secretary to the prime minister and elected to the House; Ichizo Ohara (member since 1951), former councillor at the Cabinet Secretariat and elected to the House; and Hirohisa Fujii (member since 1955), former accountant of the Budget Bureau and elected to the House of Councilors.

#### A New Trend in the Life of Former Officials of MITI

Koji Kakizawa (Independent), a former councillor at the Cabinet Secretariat and elected to the House of Representatives in 1961, says: "It would seem that the bureaucratically oriented political system of the postwar period is switching over in large measure to a system directed by politicians ever since Kakuei Tanaka was appointed Minister of Finance. I also aspired to become a politician under such a change in political current."

This is an extremely apt statement concerning the changes in the political scenery. The work of legislating has been handed over from bureaucrats to politicians and the former are merely the tools in the hands of the latter in the Diet. Furthermore, after retirement, these bureaucrats can no longer

take the lion's share as they used to, because of public outcry. It is understandable, then, that more and more bureaucrats aspire to become politicians in midcourse.

Already Michio Watanabe, former Minister of Finance, is planning to gather support among Diet members in order to form his own faction and is helping younger bureaucrats run for the Diet. The fact that as many as four young candidates from the Ministry of Finance are preparing to run in the coming election to the House of Representatives itself speaks about the changing times.

From a "migrating official" to a politician. A good example of this is Toshihiko Yano, a former undersecretary of MITI, who entered the ministry in the first half of 1948. He is expected to run for the coming election in the House of Councilors. Traditionally, retired officials of MITI were readily employed by major private corporations.

Formerly it was not so rare to see these officials become presidents of leading steel, electric power, trading, or heavy electric industries. For example, Taichiro Matsuo (1934 MITI alumnus), the present president and future chairman of Marubeni, is a former director of MITI's Regional Bureaus of International Trade and Industry. Norihumi Kumagaya, president of Sumitomo Metal Industries, Ltd, is a former undersecretary of MITI.

Although unfortunate, former undersecretary Hideaki Yamashita (1943 MITI alumnus) became president of IJPC [Iran-Japan Petrochemical] of the Iran Project, after serving as a vice president of Mitsui and Co Ltd. In addition, Sanae Honda of the Maruzen Oil Co was a former director of MITI's Project Bureau.

Recently, however, due to structural depression in the heavy chemical industry, double-dipping has not come easily, and double-dippers already secure in private industries do not readily give up their posts to their juniors.

The incident involving Shintaro Hayashi, who decided not to resign as director of the Industrial Location and Environmental Protection Bureau, was an important one. This "one man's rebellion" was reaction against the double-dipping practice.

Eventually Mr Hayashi double-dipped to the vice presidency of a large discount store "Super Jasco." He was the first former government official to find employment in the distribution industry. He was followed by Hachiro Moriguchi, a former director of the Machinery and Information Industries Bureau, who resigned his post in 1975 and entered Dai-ichi in 1977 as a vice president.

It is rumored that Shingo Moriyama, who was also a director of the Machinery and Information Industries Bureau and director, until 1981, of the Agency of Natural Resources and Energy, will enter Kyoto Ceramics this June. For the time being, it is said that he will serve as vice president and will work closely with President Kazuo Inamori. These cases are regarded as the

beginning of MITI's double-dipping into unconventional industries, such as electronics and high technology.

#### Double-Dipping to Face Crisis

In July, Keiya Toyonaga (1953), who was a former deputy director of the Agency of Natural Resources and Energy and until recently an adviser to Sumitomo Bank, will become an adviser to Matsushita Electric. It is expected that he will become a managing director at Matsushita after the general meeting of stockholders scheduled for next February.

Akira Harada, a former director of the International Trade Policy Bureau, is the present vice president of Matsushita. It would appear that Matsushita's aim in this age of electronics is to strengthen its connections with MITI.

Likewise, Riichi Hashimoto, a former International Trade Deliberation authority, has been an adviser to Mitsubishi Electric since last year. Sooner or later he is expected to be promoted to managing director.

When it comes to "migrating officials," the future course of Shoichi Akazawa, vice chairman of Fujitsu (former director of MITI's Heavy Industries Bureau), is worth noting. He entered Fujitsu in 1981, and since Takumasa Yamamoto, with an engineering background, has emerged as the president, Mr Akazawa is expected to "double-dip" to the chairmanship of JETRO.

He will take over the chairmanship held by Hisashi Murata, who came from MITI by way of Mitsui and Co. At the same time, it is expected that the post of vice chairman, held by Isamu Ikoma, who was a former director of the Osaka Regional Bureau of International Trade and Industry, will go to Shiro Miyamoto, a former director of MITI's Industrial Policy Bureau and present adviser to the Long-Term Credit Bank of Japan.

At Toyota Motors, Shigenobu Yamamoto, a former undersecretary of MITI, is a vice chairman; he will be joined by Shohei Kurihara who is at present an adviser to the Bank of Tokyo and a former International Trade Deliberation authority.

Going back to the Ministry of Finance, Takemasa Yoneyama, a former director of the Customs and Tariff Bureau, has joined Asahi Beer after retiring from a directorship of the Japan Highway Public Corp this spring. Since there had been no Ministry of Finance alumni in the three major beer manufacturers, competition among them for "double-dippers" should intensify.

From the bureaucrats' point of view, however, the time is now for a clearer application of the unwritten rule that limits double-dipping to two employments, including a stint with governmental special corporations; therefore, unless they can learn to adjust themselves to the life in private industries and prove their worth, their careers will end there. It may be that such a crisis in double-dipping practice is near at hand.

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## ECONOMIC

### MITSUBISHI'S STRUCTURAL WEAKNESS DISCLOSED

Tokyo JITSUGYOKAI in Japanese 1 Jun 83 pp 8-12

[Article: "'Shock Therapy' Abets Sense of Crisis"]

[Excerpts] Drastic steps were recently taken by the Mitsubishi Corp, including a cutback in salaries for its executives by about 10 percent and a more than 5 to 8 percent reduction in pay for its managers at section-chief level, depending on their responsibilities. This will be implemented on a tentative basis for 1 year beginning in April, but the possibility of a longer period is implied.

A cutback in pay for executives of a general trading company is not a rare phenomenon. Such firms as Mitsui & Co, which has undertaken the LJPC (Iran-Japan Petrochemical Co) project, and C Itoh & Co, which has its problems with the Toa Oil Co, have trimmed salaries when projects with impact on business have failed, or when a scandal has occurred. With the exception of the Sumitomo Corp, which has strong earning power, it is common practice among all major trading companies.

Even the Mitsubishi Corp, which prides itself on its earning capacity, once cut back bonuses for some of its managers in 1971 during the Nixon shock, when it incurred huge losses in foreign exchange.

However, the circumstances then were quite different from those during the recent measures. In the present situation, there are no restraining factors from a management point of view. Although the March 1983 quarter ended in a decrease compared to the previous quarter, an estimated operating profit of about 40 billion yen is expected, and there is an additional large "bonus." It is the LNG (liquefied natural gas) project in Brunei. There are annual dividends totaling 25-30 billion yen, which will reportedly reach 60-80 billion yen if dividends from overseas are included. Using these dividends as a base, the Mitsubishi Corp has claimed tax depreciation and disposed of its bad debts.

Why then was the Mitsubishi Corp forced to cut salaries at this point?

Of course, the Mitsubishi Corp's pay level ranks at the top among the general trading companies. It would remain high despite any cutbacks. The money saved



would only be 1.4-1.5 billion yen in annual terms. Such current expenses as personnel costs amount to as much as 150 billion yen. Even a cutback of 1 percent will not have a major impact on its business achievements.

#### Brunei LNG Project Like A "Drug"

On the other hand, it has been pointed out that "in reality the Mitsubishi Corp has deteriorated to a much more severe degree." Its earning capacity has reportedly fallen sharply in recent months. Its current profit balance in the March 1983 quarter indicates that the Mitsubishi Corp with about 40 billion yen is expected to drop to third place behind Mitsui & Co, which will clear about 60 billion yen, and the Sumitomo Corp which will have earnings of about 42 billion yen. Of course, Mitsui & Co is expected to include profits from the sales of roughly 20 billion yen worth of negotiable securities, but in any case it is expected to roughly equal Mitsubishi Corp. Moreover, the Mitsui figure does not include tax depreciation for the IJPC project.

Even the operating profit after interest deductions is estimated to end in a 5 billion yen deficit for the Mitsubishi Corp (above-mentioned March quarter). In contrast, Mitsui & Co shows a profit of 20 billion yen, C Itoh & Co a gain of 10 billion yen, the Marubeni Corp is in the black by 5 billion yen, and the Sumitomo Corp is also in the black by 40 billion yen. Furthermore, in Mitsubishi's case, operating profit minus interest costs has shown a continuous deficit for the past several years.

Although the Mitsubishi Corp claims to be at the top in profits, it is superficial. In reality, it is covering its losses with dividends from the Brunei LNG project. The "bonus" from Brunei plays such a large role that Chairman Tabe has frequently been obliged to sternly admonish employees, saying: "Do you intend to subsist on the legacy from Brunei?"

Brunei may be said to serve as a "drug" for the Mitsubishi Corp. It has affected the employees to the extent of creating an "atmosphere of self-indulgence." Despite their explanation that "the Brunei dividends do not carry much weight," there is an apparent proclivity to depend on the dividends which come in without much effort on their part. A type of business activity has evolved which is reminiscent of "people living on interest."

Brunei will gain complete independence from Britain on 31 December of this year. There is no guarantee that the annual dividends of 25-30 billion yen will continue to come in after next year. The reason is, at present the Brunei Government, the British-Dutch affiliated major oil company Royal Dutch Shell, and the Mitsubishi Corp each own one-third of the stocks, and although there will be no nationalization of the company after Brunei's independence, some change in conditions is expected. There is a strong rumor that the Brunei Government will have a 50 percent capital investment and the remainder will be shared equally by Shell and Mitsubishi. There will probably also be a change in conditions for LNG export.

Moreover, there are demands by large users of LNG for an easing of contract conditions regarding the "take or pay" clause (obligating them to accept LNG even though they may not need it) and for a reexamination of the inflexible, non-sliding oil prices. Especially today with the oil glut and declining prices, there are rising voices of dissatisfaction with the inflexibility of LNG contracts, and negotiations for lower prices are now under way.

Because of the decrease in owned stocks and lower prices, the Mitsubishi Corp will be unable to maintain the status quo in dividend revenues. It will suffer a double punch with a considerable drop in earnings.

Furthermore, in 1993, a decade later, the contract with the Brunei Government will expire. Since the LNG users will remain basically the same, the contracts will probably be renewed, but here again the possibility of changes in conditions is considered to be quite strong.

In other words, the Mitsubishi Corp will "surely face a steady decline" if it depends on Brunei. When the "legacy of Brunei" comes to an end, its earnings will drop immediately. A crucial test will be faced by the Mitsubishi Corp which has led a "life of dependence on interest earnings." Therein lies one factor which causes President Mimura and the top executives to feel a sense of crisis.

#### An Organization with "A President Under The President"

Aside from the Brunei LNG, the ratio of elements which make up the Mitsubishi Corp's sales constitutes a problem. Basically, there are three pillars of earnings: the steel sector, the energy sector and the machinery sector. All three face environmental difficulties and can expect little growth. The production of blister steel is below 100 million tons annually, and the steel manufacturers are making structural reforms in order to pay dividends at a 60-percent rate of operation. Steel sales will not necessarily run out, but they cannot continue to raise commissions under such conditions. Not to speak of the fact that the *raison d'être* of trading companies is diminishing from the standpoint of large users who criticize the trading companies for making "hidden profits" by merely passing vouchers. The trading companies are, therefore, doing their utmost to alter their approach in the steel sector, but the results are yet to be seen.

Also, regarding the energy sector which has propped up Mitsubishi sales, the rate of profit has always been low, and earnings have been increased by raising the volume handled. However, profits have declined due to the double impact of lower crude prices and a sharp drop in volume.

Meanwhile, in the machinery sector which has centered on ships and heavy machinery and has been known as the "business sector of Mitsubishi Corp," it has been pointed out that "there are very few sales made and profits gained through the efforts of the Mitsubishi Corp." Speaking of machinery, it is likely to evoke an image of growth, but the content is crucial. It may be said that the Mitsubishi Corp is lagging behind the other companies in terms of electronic machinery, which is the star attraction, or rather that it has

nothing noteworthy to show. As for cars, the strategy has been limited due to the tieup between Mitsubishi Motors and Chrysler, and although that shackle has been removed and Mitsubishi is now free to develop independently, "it has shown few good hands so far."

Relying on its outdated industry, it is 2 to 3 years behind the other major trading companies. Despite its aggressive sales system, "it has not been able to drum up new business." While this may be related to the company tradition, "any new idea proposed by an employee is seldom approved." Its overseas investments are strong on oil, LNG and coal, but they have missed the peak times and there has been nothing to make up for the misses. Its weakness in leaning toward the materials industry has surfaced, resulting in "a relatively lower status and a lack of aggressiveness toward new business approaches and transactions."

A remote factor is alleged to be the Mitsubishi Corp's system of head offices. The director of a head office was "lord of his castle," and his authority equaled that of the company president. He had the authority to move people, materials and money. As the representative of company interests, he rejected anything that might prove to be disadvantageous to his head office. The nature of the head office was such that optimum appointments of talented personnel was difficult. "The head office is so powerful that even the company president dare not intervene, thus creating a major bottleneck." In other words, at the Mitsubishi Corp there was "a president under the president."

The step President Mimura took to break through this impasse was to reassign the position of the head office director from the "jomu" (executive director) to the "torishimariyaku" (managing director), and to cut down the "jomu's" authority by assigning him as an adviser to the company president. Mimura also reorganized the system consisting of 9 product groups and 14 head offices into a system of 6 product groups and 19 head offices. It was the first drastic structural reform in 14 years, resulting in strong protests by the "jomu" who stood to lose their vested rights. Nonetheless, President Mimura pushed through the reform on 1 July 1982, and at the time the other major trading companies praised the move, saying: "Most people would avoid such a reform for fear of the resulting stress and strain, but Mr Mimura's determination is proof of his decisiveness and leadership."

It was implemented as an extension of the company's internal revitalization movement, including the "Iris Operation" during President (present adviser) Chujiro Fujino's era and the "Z Operation" during President Tabe's era. Traditionally, the "jomu" as a head office director was required only to consider the interests of the head office, but he is now required to act on behalf of the interests of the Mitsubishi Corp as a whole. The aim is to cultivate the respective real commercial interests from the standpoint of each vertical organizational unit. As for the "torishimariyaku" as the new head office director, he is given the responsibility of "protecting his own castle."

During President Tabe's era, the Mitsubishi Corp was quite stable with steel as its main commodity, and there was little tension within the company. The company also served as the coordinator of the Mitsubishi group, engaging in a "passive" type of commercial activity as the window to the group. During the "wintry age," competition continued to grow increasingly severe and a more aggressive sales approach became necessary. In order to make a breakthrough, a drastic structural reform was thus implemented.

#### The "Jomu" Becomes a "Windowside" Executive?

Mimura assumed the company presidency in June 1980. A sense of crisis has been apparent since that time. While evolving the "Z Operation" on the one hand, a "regeneration period" was utilized to map out a plan for revitalization. At the same time Mimura, who had served successively at the Seoul branch, the Nagoya branch, and the Mitsubishi Corp of America, but spent only a short time at the Tokyo head office, carried on a vigorous dialogue, not only within the company but also with the entire Mitsubishi group. As a result, he embarked on the above-mentioned structural reform.

Also, at the New Year ceremony this year, he gave an unprecedented speech. He inaugurated the reform system, naming 1981 as "the first year of the new era," and stated: "This is criticism of our employees as perhaps lacking in aggressiveness, but I don't believe it is true. Let us show our latent aggressiveness and begin a new era." "I believe that the times are changing, and that a new era is about to begin which will differ fundamentally in several aspects from the past quarter of a century." He continued: "In the growth areas of new materials, new products and new types of service industries, we will aggressively make inputs with the operational resources of our trading company such as people, money, and information." "In facing our new task, we must not easily decide that it is not fitting with the nature of our company, but must adapt our nature to meet our task." He concluded: "The crossroads of the eras is the time to determine whether we will seek victory or defeat, and it is a time when the truly superior company will make further progress."

It was a challenge to the company executives to "reform their awareness." These were unprecedentedly strong words by President Mimura who was known as a gentleman. They indicated not only confidence in the transition to a system of 19 head offices, but also an intent to instill a sense of crisis. His determination to revive the company's erstwhile "hungry spirit" was viewed with interest by the other trading companies.

Nonetheless, the recent pay cutbacks raised such rumors as "the structural reform is apparently not moving too smoothly," or "the 'jomu' have lost their initiative and have turned into 'windowside' executives," or "the evaluation of Mr Mimura is apparently declining." Moreover, there are no Showa-generation executives (born after 1926), and all the executives are well advanced in age. This of course impacts on the middle echelon managers.

If the structural reform goes well, company earnings will also rise. There will then be no need to cut back salaries. Also, since the "jomu" who have



performed the exclusive duties of the head office directors are now removed from the front line, their duties have become ambiguous, and "they no longer know what to do." This chain of events has reportedly lowered Mr Mimura's reputation.

The problem of aging has been solved by transferring older executives to affiliated companies, but the subsidiaries are now demanding top talent from the front line. It is only natural that, in order to boost their record of achievements, they would want men in their working prime instead of semi-retired "window-side" executives. In principle, it was intended that the transferred executives would be replaced after 4 years, but in substance there are few signs of rejuvenation.

#### Naivete Regarding Business Posture

On this point, Public Relations Chief Shigeo Momoki argues as follows: "Respect for seniority has always been one of Mitsubishi's virtues, although it may be a drawback from the viewpoint of the younger employees. As for structural reform, it was expected from the outset that it would take 3 years to achieve any results. One cannot expect immediate results merely because a reform has taken place. Have patience and observe us for a while before you criticize us at this stage (laughter). Regarding the evaluation of the president, that is a question for the future. My impression is that, having carried out a major reform, he himself feels he is finally headed in the direction which he had hoped for."

Momoki analyzes the cause for the drop in earnings capacity as "naivete regarding the company's business posture." Especially in an era where the quality of industrial forms has changed drastically, "naivete" becomes a minus factor. Also, new types of business are cropping up among the industries, and a new system was adopted to enable the "jōmu" to conduct thorough reviews as managers of the Mitsubishi Corp in order to meet the new challenges. For Mitsubishi, the structural reform may be considered as an indication of President Mimura's determination to "survive at any cost."

The aim was to free the company from its "dependence on Brunei." This resulted in a financial reform, but the constitutional reform of the business sector has lagged behind. Just as the LJPC crisis served as a trigger for Mitsui & Co to launch its revitalization movement, the Mitsubishi Corp was also obliged to promote a similar mood despite internal opposition. One result was structural reform and the other a cutback in salaries.

The mammoth battleship, the Mitsubishi Corp, may not produce results overnight, but its future will be unpromising unless measures are taken at each step along the road. If it waits for clarity in nebulous times, the status of the Mitsubishi Corp will sink by the time the situation becomes clear. In that sense, too, the "survival operation" of the corporation has become the center of attention.

The Mitsubishi Corp is saddled with an insecure petrochemical project in Saudi Arabia, which is being undertaken with Vice President Keisaburo Yamada



at the helm. The American Dow Chemical Co has withdrawn from it, and its certainty is in doubt. It is also rumored that the Mitsubishi Corp has incurred several tens of billions of yen in losses from sugar transactions and another several tens of billions of yen in losses from slow business in American copper mines, with a tax depreciation amounting to about 100 billion yen (although the Mitsubishi Corp denies this).

In any case, the Mitsubishi Corp unmistakably appears to be facing a crossroads as to whether it can regain its previous vitality. Attention is focused on the direction in which the skipper of the ship Mitsubishi Maru, President Mimura, will guide his ship.

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## JAPANESE ANXIETY OVER 'LOOK EAST' POLICY EXAMINED

Kuala Lumpur KUALA LUMPUR BUSINESS TIMES in English 2 Jul 83 p 10

[Article by Charles Chan]

[Text]

JAPAN'S eagerness to help Malaysia achieve the objectives of its "Look East" policy is filtering down from the national level to local governments and private sector organisations but there is a measure of concern about it among Japanese in general.

They fear that if the efforts of Japanese government and private sector failed to show tangible results, doubts about Japan's sincerity to help Malaysia may arise.

This concern surfaced in questions raised by Mr Michihiro Matsumoto, of the Planning and Public Relations Department of Osaka Chamber of Commerce and Industry during a frank exchange of views with the *Business Times* yesterday.

Mr Matsumoto and two colleagues from the non-profit Kansai Institute of Information Systems (KIIS) — Mr Mitsuo Terramoto, director of planning research, and Mr Shinji Hiratsuka, chief researcher — arrived in Malaysia on Wednesday to undertake a survey here as part of an effort to chart the future course of exchanges between Japan and other countries.

The survey is being carried out by the Institute because of the growing belief among Japanese local government and business circles that, as the 21st Century approaches, growing emphasis will be attached to more specific exchanges, such as between districts and cities in addition to exchanges between nations. The countries covered are Indonesia, Singapore, Malaysia and Thailand.

Among the knowledgeable Malaysians interviewed by the team were Mr Tan Kook Yin, a director of the Federation of Malaysian Manufacturers, and Dr Chee Peng Lim, eco-

nomics lecturer at the University of Malaya.

The team wanted to find out how Japanese local governments and the private sector could play a role in Malaysia's Look East policy which, according to Mr Matsumoto was becoming "a hot issue in Japan."

"Before we came, we thought that the policy focused just on technical fields like Japanese management methods, how to improve productivity and quality control.

"Such technical expertise can be easily imported from any country even if the cultural background is different.

"But, after our meetings with the people we have come to see, we now recognise that what you are trying to absorb, the ethics of hard work, dedication to work and loyalty to company, which are rather spiritual and cultural in origin and are not quite easy to export," he explained.

Mr Matsumoto said many Japanese citizens were wondering whether the response shown so far by their government in support of the Look East policy was adequate and satisfactory to Malaysia.

"We wonder if, in the absence of any tangible results linked to the objectives of the policy, there will be any backlash?"

Another question which intrigues the Japanese people was whether the policy arose out of national necessity or whether it meant that Malaysia was "pro Japan".

Mr Matsumoto said the Japanese people were, on the whole, inclined towards the view that the Look East policy was motivated by national aspirations and not meant to favour Japan economically at the expense of other trading partners.

On this premise, he agreed that the strengthening of Malaysia's industrial capacity through the implementation of the policy would be mutually beneficial as it could lead to a greater need for plant and machinery, an area in which Japanese companies excel in competition with rival suppliers.

With so much attention focused on Japan, he was rather surprised that the interest generated had not been followed up at local government levels to promote greater inter-action between Malaysian and Japanese cities.

"Many Japanese cities are twinned to those of other countries. Why are there no twin cities, say between Osaka and Ipoh or Penang?"

He said the promotion of exchanges at local government levels such as between respective states and cities of nations could be mutually beneficial as there were a lot of fine-tuned programmes which local authorities were more suited to initiate than the national government.

For example, he added, the Osaka Chamber of Commerce and Industry organised an international convention on trade and investment, attracting about 200 participants from Asian countries.

The organisers were able to help the participants make contacts with their Japanese counterparts with similar business interests so that specific negotiations could be carried out.

The survey team, which leave today for Bangkok, will submit a report of their findings at the end of August for the study of the KIIS and the relevant authorities in the countries visited.

## SCIENCE AND TECHNOLOGY

### STATUS OF JAPAN'S DEFENSE INDUSTRY EXAMINED

Tokyo SEIKELJIN in Japanese Apr 83 pp 47-59

[Text] The Defense Industry Is on a Steady Footing Despite the Sluggish Economy

The 29th general convention of the Japan Ordnance Association was held at the Industrial Club of Japan in Marunouchi, Tokyo, on 21 May of last year. At the convention, the association's chairman Tateno Mankichi (president of Japan Steel Works, Ltd.) gave the following keynote address.

"As I look back on last year, I think we in the defense industry enjoyed a rather thriving business, while the rest of industry as a whole was in the doldrums buffeted by the depressed economy and tight government financing situation. Recent newspaper articles have convinced me that the recognition is gradually sinking in among the people that 'defending one's own country is their responsibility,' and that as a result the atmosphere is improving to the extent that there is nothing awkward about discussing defense problems. Partially spurred by pressure from abroad for an increased defense role, the feeling, I think, has been gaining strength since last year at home that Japan should fulfill its responsibility as a member of the West. We in the defense industry are heartened to be able to meet the new year in such an environment, and at the same time we keenly feel the importance of our responsibility to successfully respond to demands for arms."

Chairman Tateno's speed forthrightly expresses, somewhat in undertones, the satisfaction of the defense industry over the fact that given the sluggish economy and the government's budgetary restraints, the defense industry has been doing "fairly well."

By "last year," Mr Tateno means the state of the arms industry (including related industries) in fiscal 1981 when the defense-related budget gained 7.6 percent over the previous year, to 2.4 trillion yen. In the budget for fiscal 1982, the spending for defense showed an "upsurge," reaching 2,586,100,000,000 yen (up 7.8 percent over the previous year). In the budget for fiscal 1983 when a policy was carried through to limit requests for budgetary appropriations by various ministries to their levels of the preceding year (zero ceilings), meaning reductions in budgetary allocations in real terms, the defense budget again gained 6.5 percent over the year before, to 2,754,200,000,000 yen, accounting for 0.98 percent of GNP. Given such "fine work," (successive increases in

defense spending), it is hardly surprising how delighted the defense industry is.

**Increases in Defense Spending:** The defense industry of Japan is relying 100 percent on the Defense Agency for business. In keeping pace with "bulges" in defense budgets, the industry has grown dramatically, and it is certain the industry will become a trillion-yen industry in fiscal year 1983.

This is owing to the fact that with the National Defense Council's approval of the "1981 Mid-Term Operations Estimates" (frontal equipment procurement programs for the 1983-87 period) on 23 July of last year, there is now the prospect that the defense strength of our country will roughly attain the levels being called for in the "Defense Guideline." (Outlining the goal of defensive power our country is to maintain in peacetime, it aims for construction of a defensive structure that will deter invasion in advance. This was decided by the Cabinet in 1976.) Also owing to the policy of placing priority on beefing up stockpiles of arms, outlays for frontal equipment have been greatly increased in the defense budget for fiscal 1983, the first year of the 1981 Mid-Term Operations Estimates.

Increases in defense budgets since 1979 are as follows:

<u>Fiscal year</u>	<u>In hundred millions of yen</u>	<u>Increase rate</u>
1979	20,945	10.2 percent
1980	22,302	6.5 "
1981	24,000	7.6 "
1982	25,861	7.8 "
1983 (estimate)	27,542	6.5 "

In these draft budgets, outlays for purchases of frontal equipment--weaponry including arms, aircraft, vehicles, ships, etc.--accounted for 344.9 billion yen in fiscal 1979, showing an increase of 17.5 percent, and the figure was 389.8 billion yen for fiscal 1980, up 13 percent and 458.6 billion yen for fiscal 1981, up 17.1 percent, 509.7 billion yen for 1982, up 11.1 percent, and 607.6 billion yen for fiscal 1983, a staggering 21.2-percent increase. That outlays for purchases of frontal equipment have been growing at a rate far higher than the growth rate in the given year's defense budget for years indicates that the arms buildup has been steadily advancing, and this is the factor contributing greatly to the remarkable growth of the defense industry.

According to a survey of 100 member firms of the Japan Ordnance Association conducted by sending them a questionnaire, output of weapons in fiscal 1981 (April 1981-March 1982) was 602,954,000,000 yen, an increase of 15.3 percent over the previous year (522.7 billion yen), topping for the first time the 600-billion-yen mark. The largest winners of them all were aircraft and weapons, each registering an output increase in excess of 20 percent, and this is all evidence that arms production has been increasing at a great tempo supported by increases in the defense budget for the past years.

Breakdown of the major items--total of items manufactured on direct contracts from the Defense Agency and items produced by the third parties on orders from the Defense Agency contractors--are as follows: Weapons (61 firms)--192.61 billion yen (previous year 159.6 billion yen); vehicles (15 firms)--39.36 billion yen (36.01 billion yen); facilities and equipment (7 firms)--1.87 billion yen (1.24 billion yen); electric and electronics equipment (47 firms)--85.11 billion yen (79.83 billion yen); aircraft (27 firms)--209.49 billion yen (163.7 billion yen); ships (19 firms)--71.9 billion yen (81.76 billion yen); others (12 firms)--3.43 billion yen (0.58 billion yen).

These figures show that output has surged not only in the fields of aircraft and weapons manufacture, but also in the categories of production of electric and electronics equipment, facilities and equipment and others.

The Japan Ordnance Association is made up of 100 full members, and the association's statistics on defense production are tabulated based on answers to a questionnaire from the full members, but the real number of firms having a business relationship with the Defense Agency is not so small. There are as many as 2,272 qualified firms (fiscal 1981) registered with the Central Procurement Office of the Defense Agency, which is the purchasing arm of major arms and equipment. Exclusive of distributors, the number of registered firms engaged in productive activity totals 1,400 from such fields as weapons (13 manufacturers), electric communications (248 manufacturers), fire arms and ammunition (14 manufacturers), chemicals (105 firms), ships (103 firms), aircraft (60 firms), machines (199 firms), vehicles (50 firms) and others including fuel, food, textile, supplies, medical supplies, rubber, etc.

The full member enterprises of the Japan Ordnance Association, of course, make up the core corps of the defense industry and weapons production, but we must not forget the fact that beside them there are many businesses benefiting from the defense budget.

Influence of "Pressure for Increased Defense Buildup": The sharp increases in the amounts of contracts the Defense Agency awarded to the top five defense industries (Mitsubishi Heavy Industries, Ltd.; Ishikawajima-Harima Heavy Industries Co., Ltd.; Kawasaki Heavy Industries, Ltd.; Mitsubishi Electric Corp.; and Toshiba Corp.) in fiscal 1980 typically represent the recent rapid growth of the defense-related industries. All five firms posted large gains in defense contracts in fiscal 1980 led by the top defense contractor, Mitsubishi Heavy Industries, which earned 234.54 billion yen in defense contracts--a 2.4-fold increase over the previous year--and the second runner, Ishikawajima-Harima Heavy Industries Co., which clinched 108.48 billion yen--a 2.7-fold gain over the preceding year--although the sharp increase rates in contracts for the two firms are partly the reflection of the fact that the sums of their 1979 contracts dipped from their levels in the preceding year because of the contracting formula in which contracts for aircraft and ships are awarded every 2 years and that the year 1979 happened to be an "off-year." Kawasaki Heavy Industries, which stood in third place in the 1980 sweepstakes, increased its contract sums from 40.3 billion yen in fiscal 1978 to 49.55 billion yen in fiscal 1979 to 81.2 billion yen in fiscal 1980, up 64 percent over the preceding year. For the fourth-runner Mitsubishi Electric Corp., earnings from



defense contracts increased from 52.32 billion yen in fiscal 1978 to 53.96 billion yen in fiscal 1979 to 72.39 billion yen, up 34 percent. The figures for the fifth-running Toshiba Corp. were 17.37 billion yen in fiscal 1978, 18.19 billion yen in fiscal 1979, and 32.91 billion yen in fiscal 1980, up 81 percent.

Such increases were not the monopoly of the top five. The runners-up following them also chalked up huge increases. The 6th-place Nippon Electric Co., Ltd. recorded a 34 percent increase, the 7th-ranked C. Itoh & Co. Aviation a 92 percent increase, the 8th-place Nippon Oil Co., Ltd. an increase of 46 percent, the 9th-ranked Nippon Steel Works, Ltd. a gain of 51 percent, and the 10th-place Sumitomo Heavy Industries, Ltd. a 68 percent increase.

In fiscal 1981 (April 1981-March 1982), the majority of major industries, beginning with the five top defense contractors and including the builders of escort ships and other craft--a reaction of a large production growth in the previous year--suffered dips in sales to the Defense Agency compared with the previous year because no orders were issued for the main force aircraft, including the F-15 fighters and P-3C antisubmarine patrol aircraft. Orders for them had been issued in the preceding year. Even then, sales to the Defense Agency by Hitachi Shipbuilding and Engineering Co., Ltd., which was 6th place in the ranking in fiscal 1981 had been increasing smoothly from 6.7 billion yen in fiscal 1979 to 11.41 billion yen in fiscal 1980 to 17.25 billion yen in fiscal 1981, up 51 percent. The 9th-ranked Nippon Steel Works gained 19 percent, to 14.65 billion yen, and the 10th-placed Komatsu Ltd. chalked up sales of 13.69 billion yen, an increase of 14 percent. As the Japan Ordnance Association survey shows, the average of output gains over the years has been showing a great increase as the year advances.

The rapid growth of the weapons-manufacturing industry has been greatly accelerated by the changing domestic and international environment concerning defense buildups around Japan in recent years. It may be said that the rapid growth of the defense industry is in line with a new defense policy of Japan which, spurred on by the U.S. "demand for increased Japanese defense buildup," was formulated against the following backgrounds: With the coming into office of the Reagan government, the policy line has been adopted seeking "a strong America with Western military superiority over the Soviet Union"; the pressure demanding that Japan increase its defense buildup and take over more of the role for its defense that has arisen in the wake of trade frictions; and the birth of the "hawkish" Nakasone government at home and the appearance of the voice "calling for defense of the sea lanes."

**Favorable Condition Created by the "Bulge" in Appropriations for Defense Budget:** In May 1981, at the Japan-U.S. summit meeting in Washington, then prime minister Suzuki Zenko, who was reported to be "diplomatically ignorant," issued a joint statement to the effect that "Japan and the United States have an alliance relationship," and stated that "we will defend waters several hundred miles off the shore of Japan and the sea lanes up to about 1,000 nautical miles from Japan" as "our garden."

Then, at the 13th Japan-U.S. Security Treaty secretariat-level meeting held in Hawaii in June of the same year and on the occasion of then director general

of the Defense Agency Omura's U.S. visit, the United States pressed the Japanese Government to come up with evidence showing its efforts for defense.

The list of targets for the Japanese defense buildup put forward by the U.S. side included organization of 14 interceptor units (350 aircraft), 6 support flight units and 2 early warning units for the Air Self-Defense Force, and a fleet of 70 missile escort ships and 25 submarines. The U.S. goals were each far above the Japanese numbers in the Defense Guideline, and the U.S. plan was extraordinarily larger than the Japanese plan.

True to its objective of building up stockpiles of equipment for maritime and air defenses, the 1981 Mid-Term Operations Estimates put forth a policy for beefing up inventories of aircraft, ships, and air defense systems and anti-submarine capabilities. Under the 1981 Mid-Term Operations Estimates, major equipment is to be provided for roughly to the levels being called for in the Defense Guideline but the ceilings for the procurement of P-3C antisubmarine patrol aircraft and F-15 interceptor fighter aircraft have been raised beyond the framework of the Defense Guideline. As for the two types of aircraft, the National Defense Council meeting held in December 1977 decided on procurement of 45 P-3C's and 100 F-15's in the years from fiscal 1978 onward, but the numbers were revised upward to 75 P-3C's and 155 F-15's at the National Defense Council meeting held on 28 December 1982 on the grounds that the increases were necessary for Japan to assume "an appropriate share of role" commensurate with the "alliance relationship" taken up in the recent Japan-U.S. talks. Since up until fiscal 1982, allocations for procurement of 25 P-3C's and 80 F-15's had been appropriated in the budgets, all that remained to be purchased were 20 units each for the P-3C and F-15. In the upwardly revised ceilings, the P-3C and the F-15 were given preferential treatment over other weapons, with the number of units to be procured from fiscal 1983 onward to be increased from 20 to 50 for the former and from 20 to 75 for the latter.

As a result, the total defense-related spending during the 1981 Mid-Term Operations Estimates (fiscal 1983-1987) is to reach, according to a Defense Agency estimate, 15.6 trillion to 16.4 trillion yen (annual increase rates of 6.3 percent to 8 percent) in 1982 funds.

The phenomenon in which spending for defense increases at "an extraordinarily higher rate" relative to other items despite the current tight budgetary situation is to last for several years, and the rate of increase in spending for frontal equipment, which is to expand greatly centered on purchases of a large number of high-priced items, including aircraft and ships, will be far larger.

Outlays for frontal equipment had been increasing from 238.9 billion yen in the second 5-year defense buildup plan (1962-66), to 554 billion yen in the third 5-year defense buildup plan (1967-71), to 1,062,500,000,000 yen in the fourth 5-year defense buildup plan (1972-76), and to 1,754,100,000,000 yen for the 5-year period from 1977 to 1981 during which the defense budget was compiled on a single-year basis and the annual increase rate for the whole period was 15.3 percent.

Outlays for frontal equipment buildup during the 1978 Mid-Term Operations Estimates (1980-84) are projected to reach between 2.7 trillion yen and

2.8 trillion yen, reaching annual increase rates of 15.3 percent to 16.6 percent. In the "1981 Mid-Term Operations Estimates" that covers the period from the current fiscal year 1983 to fiscal year 1987, expenditures for frontal equipment buildup are projected to reach, in fiscal 1982 funds, 4.4 trillion to 4.6 trillion yen, showing annual increase rates from 18.8 percent to 20.4 percent. The cost for frontal equipment buildup of from 4.4 trillion to 4.6 trillion yen projected in the "1981 Mid-Term Operations Estimates" is the sum of money to be paid out in cash during the period of the program, and the figure is expected to increase to 5.3 trillion yen on a contract basis. Anyway, outlays for frontal equipment buildup during the 1981 Mid-Term Operations Estimates are projected to expand to 1.6 to 1.7 times those for the 1978 Mid-Term Operations Estimates, and with it Defense Agency procurement of weapons will gain further speed.

**Numbers and Costs of Major Equipment:** The following are the numbers and costs of major equipment to be purchased during the 1981 Mid-Term Operations Estimates period (firms listed here are the main contractors).

(GSDF) 74-type tank (Mitsubishi Heavy Industries, Ltd.)--373 units (145.5 billion yen); new 155-mm howitzer (Japan Steel Works, Ltd., Kobe Steel, Ltd.)--176 units (63.4 billion yen); antitank helicopter AH-1S (Fuji Heavy Industries Ltd.)--43 units (97.2 billion yen); multipurpose helicopter HU-1H (Fuji Heavy Industries Ltd., Kawasaki Heavy Industries, Ltd.)--53 units (31.8 billion yen).

(MSDF) Escort ship DDG (various shipbuilding firms)--3 ships (229.9 billion yen); escort ship DD (various shipbuilding firms)--8 ships (389.6 billion yen); submarines (Mitsubishi Heavy Industries, Ltd., Kawasaki Heavy Industries, Ltd.)--6 ships (199 billion yen); antisubmarine patrol aircraft P-3C (Kawasaki Heavy Industries, Ltd.)--50 units (628 billion yen); antisubmarine helicopter HSS-2B (Mitsubishi Heavy Industries, Ltd.)--43 units (112.2 billion yen).

(ASDF) Interceptor fighter aircraft F-15 (Mitsubishi Heavy Industries, Ltd.)--75 units (936.8 billion yen); transport aircraft C-130H (imports)--8 units (60 billion yen); middle-level trainer aircraft XT-4 (Kawasaki Heavy Industries, Ltd.)--45 units (112.5 billion yen).

(Missiles) (GSDF & ASDF) Short SAM "81 type short-range ground-to-air guided missile" (Toshiba Corp.)--74 units (235.3 billion yen); Portable SAM "portable type ground-to-air guided missile"(imports)--840 units (33.6 billion yen).

Ships are the highest priced items in terms of unit price, and all the ships on the purchasing list here are guided-missile escort ships built by the five firms of Mitsubishi Heavy Industries, Ltd., Ishikawajima-Harima Heavy Industries Co., Ltd., Hitachi Shipbuilding and Engineering Co., Ltd., Sumitomo Heavy Industries, Ltd., and Mitsui Engineering and Shipbuilding Co., Ltd.

As for aircraft, the F-15 interceptor fighter aircraft and the P-3C antisubmarine patrol aircraft are the major items. The Ground Self-Defense Force will have its fleets of antitank helicopters and multipurpose helicopters substantially beefed up.

As for missiles, the number of Short SAM's will have increased to 87 units upon completion of the 1981 Mid-Term Operations Estimates. At present, the introduction of a new ground-to-air missile (SAM-X) is being studied, and awaiting a feasibility study for its development, a decision is pending for its deployment.

Outlays for frontal equipment buildup during the 1981 Mid-Term Operations Estimates are projected to reach from 4.4 trillion to 4.6 trillion yen on the basis of cash payments, but the figure includes payments for weapons purchase commitments made before fiscal 1982 that come due during the period (installment payments) totaling about 1.4 trillion yen, so the cash that can be used for procurement of new weapons comes to between 3 trillion and 3.2 trillion yen. Since the total cost of the frontal equipment buildup during the 1981 Mid-Term Operations Estimates term is 5.3 trillion yen on a contract basis, it transpires that a sum of from 2.1 trillion yen to 2.3 trillion yen will have to be paid in installments in later fiscal years.

A Policy of "Shouldering an Appropriate Level of Responsibility": The total of the fiscal 1983 Defense Agency budget is 2,754,200,000,000 of which expenditures for frontal equipment buildup account for 617.6 billion yen, achieving a sharp increase of 21.2 percent over the previous year. The ratio of defense cost to expenditures in the General Accounts is 5.5 percent (5.2 percent in fiscal 1982), accounting for 0.98 percent (0.93 percent in fiscal 1982) of GNP.

The ratio of the frontal equipment buildup cost to the Defense Agency budget is 22.3 percent (19.7 percent in fiscal 1982), topping the 20 percent level for the first time since 1973.

As to the reason why the value of production for defense by the defense-related industries is larger than the Defense Agency's budget for frontal equipment buildup (the cost of frontal equipment buildup for fiscal 1980 was 389.8 billion yen, while output was 604.1 billion yen according to "The Guide to Defense Procurements"), it is because production is made on a contract basis. Since the records show that until now defense production in the field of weapons has been maintaining a relationship of 1.69 times the worth of outlays for frontal equipment buildup for the year, the 1983 defense output is for the first time to top the 1-trillion mark, to 1,043,700,000,000 yen. In the same way, when outlays for frontal equipment buildup during the 1981 Mid-Term Operations Estimates period are 4.6 trillion yen, the defense production for fiscal 1985 is expected for the first time to top the 1.5-trillion-yen mark (projected expenditures for the frontal equipment buildup—890 billion yen), attaining 1,504,100,000,000 yen.

Major weapons directly contributing to increased output by defense-related industries are the following (the figures are calculated based on preliminary requests for budgetary appropriations by various forces):

Twenty-four 75-type 155mm self-propelled howitzers (7.2 billion yen); 20 new 155mm howitzers (7.2 billion yen); sixty 74-type tanks (23.4 billion yen); a battery of improved Hawks (28.6 billion yen); 5 sets of Short SAM's



(16 billion yen); 5 antitank helicopters AH-1S (11.3 billion yen); 7 multipurpose helicopters HU-1H (4.2 billion yen); 7 P-3C antisubmarine patrol planes (87.92 billion yen); 5 antisubmarine HSS-2B helicopters (13.5 billion yen); 13 F-15 fighters (162.37 billion yen); one 4,500-ton DDG escort ship (76.6 billion yen); one 3,400-ton DDG escort ship (48.7 billion yen); 1 SS submarine (33.2 billion yen).

The defense industry has a wide expanse ranging from production of big-ticket items like escort ships that cost 76.6 billion yen per ship and the P-3C, which is priced at 12.56 billion yen per unit, and the F-15 costing 12.49 billion yen per plane to the manufacture of arms, ammunition, electric communications equipment, tanks, vehicles and others.

Riding the wave of a new defense policy that seeks to have Japan shoulder an "appropriate role" in the form of defense of 1,000 nautical miles in Far Eastern waters, the frontal equipment buildup in our country is expected to advance at a fast clip, and with it the defense-related industries will grow steadily.

In Kabutocho (the Japanese equivalent of Wall Street), which is sensitive to the trend of the times, stocks of the defense industries, including Mitsubishi Heavy Industries, Fuji Heavy Industries, Hitachi, Ltd., Nippon Electric Co., and Toshiba Corp., and of high-tech firms whose technologies can be applied to military use, have been bullishly traded. Among these firms are weapons manufacturers that are relying heavily on arms production for business, and for them developments in defense buildup plans are a matter of great concern that affects their fortunes as a corporation.

Values of Defense Agency Purchases From Major Firms: The position of the defense industry in all the manufacturing industry of Japan is still minuscule. Even if the total Defense Agency expenditures for the procurement of frontal equipment as well as of oil, textiles, medical supplies, foods, and others during fiscal 1980 are tallied up, it amounted to 784.3 billion yen (of which 604.1 billion yen went to the procurement of frontal equipment), accounting for a mere 0.38 percent of Japanese industrial production.

Defense Agency purchases of weapons from the major firms during fiscal 1981 were as shown in Table 1. (The total value of contracts was 758.9 billion yen.) As can be seen from the table, Mitsubishi Heavy Industries, Ltd. leads the pack, clinching 13.9 percent worth of the total value of the Defense Agency contracts. A prime manufacturer of the prized domestically developed 74-type tank, the DDG escort ship and the F-15 interceptor fighter, the firm has started production of an air-to-ship missile. Plans are progressing to convert the missile for use as a ground-to-ship missile for the Ground Self-Defense Force.

The firm's weapons division, however, accounts for only 6.2 percent of its total sales, and even for the top Defense Agency contractor the contribution of its weapons sales to its total sales is small. Of the top 10 Defense Agency contractors, those whose weapons-sales to total-sales ratio is in excess of 10 percent are only the 9th-ranked Japan Steel Works., Ltd. at 10.7 percent,



followed by Kawasaki Heavy Industries, Ltd., of 7.9 percent. With the exception of Mitsubishi Heavy Industries, Ltd., the ratio is smaller than 5 percent for the rest of the companies.

As the table shows, the country's leading corporations which also happen to be leading Defense Agency contractors are not relying so heavily on Defense Agency contracts for their business, but among the makers of defense-related equipment are those whose sales come to a large extent from their sales to the Defense Agency. A survey of corporate financial reports for the latest accounting term of fiscal 1981 shows that Japan Aircraft Mfg. Co., Ltd. (Yokohama City) with Defense Agency contracts worth 11.2 billion yen gained 82 percent of its total sales from sales to the agency (percentage of sales to the Defense Agency to the total sales), followed by Sumitomo Precision Products Co., Ltd. with Defense Agency contracts totaling 9.2 billion yen (Amagasaki City) at 42 percent. Japan Aircraft Mfg. Co. is an aircraft parts manufacturer making pylons, launchers and others, and Sumitomo Precision Products Co. also produces similar parts such as propellers and landing gears.

Among the next group of firms whose sales come largely from their Defense Agency contracts are the following: 1.6 billion yen, or 33 percent of total sales, for Sakura Rubber Co., Ltd. of Tokyo, which makes aircraft hoses and rubber parts; 2.2 billion yen, or 31 percent, for Asahi Precision Co., Ltd. of Owari-Asahi City, a manufacturer of ammunition; 10.8 billion yen, or 27 percent, for Tokyo Keiki Co., Ltd., which makes instruments and radar; 7.7 billion yen, or 27 percent, for Teijin Seiki Co., Ltd. of Osaka City, which makes oil hydraulic equipment parts; 14.1 billion yen, or 22 percent, for Japan Radio Co., Ltd. of Mitaka City, a manufacturer of radar; 7 billion yen or 20 percent, for Japan Aviation Electronics Industry, Ltd. of Tokyo, which makes guidance equipment; 2.5 billion yen, or 17 percent, for Ishikawa Seisakusho, Ltd. of Kanazawa City, a manufacturer of mines; 7.7 billion yen, or 11 percent, for Shinmeiwa Industry Co., Ltd. of Nishinomiya City, a manufacturer of flying boats and F-15 components; and 7 billion yen, or 10 percent, for Minebea Co., Ltd. of Tokyo, a manufacturer of rod ends and screws. Nittoku Metal Industry Co., Ltd., a manufacturer of Vulcans and engine blades which merged in October 1982 with Sumitomo Heavy Industries, Ltd. was depending on the Defense Agency for 30 percent of its business in 1981, pushing it to fifth place in the ranking of firms dependent on the Defense Agency.

Among the firms that had been top Defense Agency contractors prior to 1981 but failed to enter their names in the list of top 20 firms for the year are the following: Sumitomo Heavy Industries, Ltd. (sales to Defense Agency 12.04 billion yen), 10th in 1980; Teijin Seiki Co., Ltd. (9.39 billion yen), 13th in 1980; Hitachi, Ltd. (8.93 billion yen), 14th in 1980; Shimadzu Corp. (6.71 billion yen), 20th in 1980; Nippon Kokan K.K. (16.58 billion yen), 7th in 1979; Fujitsu Ltd. (7.66 billion yen), 13th in 1979; Fuji Electric Co., Ltd. (5.85 billion yen), 19th in 1979; Nippon Kiko Co., Ltd. (4.38 billion yen), 19th in 1978.

For makers of firearms and ammunition, the rate of their dependence on Defense Agency purchases inevitably goes up. A survey of sales to the Defense Agency to the total sales ratios for the past years reveals that the figure was a bit over 30 percent for Asahi Precision Co., Ltd., a manufacturer of ammunition and 22 percent for Ishikawa Seisakusho, Ltd., a

Table 1. Top-Ranked 20 Firms in Defense Agency Contracts in Fiscal 1981

(Unit: 1 million yen, percent)

Order	Firm Name	1981 contract value	1981 share	Percent of contracts to total shares	Orders in past 3 years				1981 major contract items
					78	79	80		
1	Mitsubishi Heavy Industries	105,215	13.9	6.2	1	1	1	74-type tank, DDG	
2	Kawasaki Heavy Industries	60,264	7.9	7.9	4	3	3	DDG, main engines for DD	
3	Mitsubishi Electric Corp.	58,613	7.9	4.5	3	2	4	Hawk	
4	Ishikawajima-Harima Heavy Industries	35,668	4.7	4.6	2	4	2	DD, F-1 engines	
5	Tohiba Corp.	32,194	4.2	1.8	5	5	5	Short SAM	
6	Hitachi Shipbuilding & Engineering	17,245	2.3	3.6	6	18	12	DD, mine sweeper	
7	Nippon Electric Co.	16,380	2.2	1.6	7	6	6	Radio equipment	
8	Mitsui Engineering & Shipbuilding	15,448	2.0	4.2	-	8	-	Submarine rescue mother ship	
9	Japan Steel Works	14,654	1.9	10.7	10	12	9	155mm howitzer	
10	Komatsu Ltd	13,668	1.8	2.4	9	9	11	203mm self-propelled howitzer	
11	Nippon Oil Co.	13,248	1.7	0.4	17	10	8	Fuel	
12	Sumitomo Corp.	9,701	1.3	0.1	-	-	-	Computer testing sets	
13	C. Itoh & Co. Aviation	8,830	1.2	32.7	-	14	7	Instrument flight trainer	
14	Fuji Heavy Industries	8,325	1.1	1.6	16	16	-	Multipurpose helicopter	
15	Maruzen Oil Co.	7,620	1.0	0.4	20	-	15	Fuel	
16	Okai Electric Industry	7,352	1.0	3.4	15	11	16	Sonar buoy	
17	Nissan Motor	7,237	1.0	0.2	18	20	-	Firing device	
18	Idemitsu Kosan	6,889	0.9	0.2	-	-	-	Fuel	
19	Kyodo Oil Co	6,711	0.9	0.2	-	-	-	Fuel	
20	Daikin Kogyo	6,677	0.9	5.0	14	-	19	Fuel	
Grand total		451,959	59.6						
Defense Agency Contracts total		758,932	100.0						

Note: - mark shows below the 20th in ranking

Note: The "percent of contracts to total sales" is the value of Defense Agency contracts/total sales in the latest accounting term

Note: Source: Defense Agency

manufacturer of land mines. In addition to these firms, Mitsubishi Heavy Industries, Ltd., Kawasaki Heavy Industries, Ltd., Hitachi Shipbuilding & Engineering Co., and Mitsubishi Electric Corp. are also making weapons. Nippon Steel Works, Ltd. and Nittoku Metal Industry Co., Ltd. mentioned above are also highly dependent on weapons. Daikin Kogyo Co., Ltd. earned 6 percent of its total sales from its sale of ammunition to the Defense Agency.

Arms production in fiscal 1981 surged by 20.7 percent over the previous year, to 192.6 billion yen (the Japan Ordnance Association survey). These included machineguns, trench mortars, howitzers and rocket launchers, and among other leading arms and ammunitions manufacturers are Kobe Steel, Ltd., Howa Machinery, Ltd., Kyosan Electric Mfg. Co., Ltd., Japan Electronic Instruments Co., Ltd., Ricoh Watch Co., Ltd., Nippon Kayaku Co., Ltd., Nippon Koki Kogyo Co., Ltd., and Daikin Kogyo Co., Ltd. As for the self-propelled howitzer, the manufacturer of the gunbarrel is Nippon Steel Works, Ltd., and the mount is produced by Komatsu Ltd.

The Leviathan of the Defense Industry Mitsubishi Heavy Industries: In the Defense Agency budget for fiscal 1983 outlays are appropriated for purchases of sixty 74-type tanks, nine 73-type armored vehicles, ten 82-type command and communications cars, and twenty-two 78-type snowmobiles. In this field, Mitsubishi Heavy Industries, Ltd., the leading defense industry contractor, is overwhelming the rest of the pack, and it has been delivering to the Defense Agency from about seventy-two to eighty 74-type tanks every year for the past several years. At a maximum speed of 53 kilometers per hour and with a range of about 300 kilometers, the 74-type tank is equipped with an oil hydraulic-operated suspension mechanism, laser range finder, trajectory calculator and a turret stabilizing mechanism. Domestically developed, the tank is a world prize being provided with capabilities such as crossing rivers while submerged and firing in the dark. Developed over a 10-year period with the cooperation of Japan Steel Works, Ltd. (105mm cannon), Nippon Electric Co., Ltd. (laser range finder, night vision device), Howa Machinery, Ltd. (ignition and detonation device) and Mitsubishi Electric Corp. (fire control system--FCS--and communications equipment) and other firms including Komatsu Ltd., Daikin Kogyo Co., Ltd., Nippon Koki Kogyo Co., Ltd., Nittoku Metal Industry Co., Ltd., and Asahi Precision Co., Ltd., the tank was officially adopted in 1974.

Under the 1981 Mid-Term Operations Estimates program, 373 units of the tanks are to be purchased. At a price of 390 million yen per tank, the total cost comes to 145.5 billion yen. The tank itself is a "body of new technologies" including electronics, but the development of a further automated 88-type tank is underway.

The largest single item in the 1981 Mid-Term Operations Estimates and the fiscal 1983 budget is the purchase of aircraft. During the period, the strength of the interceptor fighter force is to be increased to 155 F-15's, and purchases of 75 P-3C antisubmarine patrol planes are planned.

Provided with a powerful thrust, the F-15 is in a class by itself in terms of combat mobility and climbing power (it can climb to an altitude of 1,500 meters in 1 minute). It has a cruising speed of Mach 2.5, and its prime contractor is also Mitsubishi Heavy Industries, Ltd. Kawasaki Heavy Industries,

Ltd. as a subcontractor is participating in the project in the manufacture of the body (share of work—35 percent). The prime contractor for the manufacture of the engine is Ishikawajima-Harima Heavy Industries Co. Ltd. (60 percent of work), with Mitsubishi Heavy Industries, Ltd. (20 percent) and Kawasaki Heavy Industries, Ltd. (20 percent) participating in the project as subcontractors. In making the components for the F-15, the following firms are cooperating: Mitsubishi Electric Corp. (fire control system, UHF radio and automatic direction detector); Toshiba Corp. (lead computing gyro, and inertial navigation system); Nippon Electric Co., Ltd. (TACAN); Shimadzu Corp. (head-up display); Hitachi, Ltd. (data link receiver); Tokyo Keiki Co., Ltd. (radar display, posture standards system, radar warning system, and meteorological data computing system); Toyo Communication Equipment Co., Ltd. (IFF challenge system); Nittoku Metal Industry Co., Ltd. (20mm cannon); Japan Aviation Electronics Industry, Ltd. (auto-pilot); Daicel Ltd. (emergency exit system); Sumitomo Precision Products Co., Ltd. (landing gears); and Teijin Seiki Co., Ltd. (oil hydraulic system parts).

Original plans called for procurement of 45 P-3C's, but the number was raised to a total of 75 planes in December 1982. For fiscal 1983, purchases of 7 of the aircraft were approved, and orders for the aircraft will continue for years at an average of 11 planes per year. Priced at 12.56 billion yen per plane in 1983 funds, the whole project, which calls for purchases of 50 units of the aircraft during the 1981 Mid-Term Operations Estimates period, will cost 628 billion yen. True to its nickname "a flying computer," the P-3C is a plane that, loaded with electronic devices, is used to search for nuclear submarines. With a crew of 10, it can fly at a maximum speed of 400 knots and has a range of 7,700 kilometers.

The prime contractor of the P-3C body is Kawasaki Heavy Industries, Ltd. (share of work—53.6 percent, manufacturer of the midsection, and final assembly), and the subcontractors are Japan Aircraft Mfg. Co., Ltd. (work share—16.6 percent, nacelle and exhaust pipe), Shinmeiwa Industry Co., Ltd. (12.2 percent, the nose, empennage and flaps), Fuji Heavy Industries Ltd. (9.7 percent, main wings), and Mitsubishi Heavy Industries, Ltd. (7.9 percent, forward fuselage and rear fuselage). The prime contractor for the engine is Ishikawajima-Harima Heavy Industries Co., Ltd., and the subcontractors are Kawasaki Heavy Industries, Ltd. and Mitsubishi Heavy Industries, Ltd.

**Three Leading Aircraft Body-Makers Enjoy a Thriving Business:** In addition to these industries mentioned above, the following manufacturers are participating in the P-3C project in the following fields. Mitsubishi Electric Corp. (UHF automatic direction measuring system); Toshiba Corp. (tactical data output control system); Nippon Electric Co., Ltd. (sonar buoy control system); Shimadzu Corp. (signal conversion system); Kokusai Electronics Corp. (HF scrambler); Japan Radio Co., Ltd. (sonar buoy receiving tube); Sumitomo Precision Products Co., Ltd. (propeller); Teijin Seiki Co., Ltd. (oil hydraulic servocylinder) and Nagano Japan Radio Co., Ltd. (high-level warning system).

While the aircraft manufacturers of the world are suffering from a low rate of operation buffeted by a diminished demand for commercial aircraft, the three leading aircraft body-makers of Japan—Mitsubishi Heavy Industries, Ltd.,



Kawasaki Heavy Industries, Ltd., and Fuji Heavy Industries Ltd.--are doing a thriving business.

As for helicopters, Fuji Heavy Industries Ltd. is the prime contractor, manufacturing five AH-1S antitank helicopters and seven HU-1H multipurpose helicopters. During the 1981 Mid-Term Operations Estimates period, 43 AH-1S's and 53 HU-1H's are to be purchased at costs in 1983 money of 97.2 billion yen and 31.8 billion yen, respectively. With the start of purchases of the next generation of large-size CHX helicopters drawing near, an increased output of helicopters is expected.

As for other activities related to aircraft, the domestic development of a new middle-level T-4 (MTX) trainer is being promoted with Kawasaki Heavy Industries, Ltd. as the prime contractor, and following it is the development of a support fighter aircraft of the next generation (FSX). The T-4 project entails domestic development of a small-size turbofan engine by Ishikawajima-Harima Heavy Industries Co., Ltd. The FSX with a lowered combat capability may be adopted as a replacement for the revised F-4EJ, and thus expectations are high that the aircraft will open up a big market.

As for building ships and craft, the roles of the shipbuilding firms are fixed. Construction of escort ships is monopolized by the five shipbuilding firms of Mitsubishi Heavy Industries, Ltd., Ishikawajima-Harima Heavy Industries Co., Ltd., Sumitomo Heavy Industries, Ltd., Hitachi Shipbuilding and Engineering Co., Ltd. and Mitsui Engineering and Shipbuilding Co., Ltd. Contracts for the construction of submarines go to Mitsubishi Heavy Industries, Ltd. and Kawasaki Heavy Industries, Ltd. Minesweepers are built by Nippon Kokan K.K. and Hitachi Shipbuilding and Engineering Co., Ltd. In the 1981 Mid-Term Operations Estimates, construction of 14 missile escort ships is planned.

Electronics are abundantly employed in escort ships provided with helicopters and missile escort ships, but there still remains much room for systematization by computer, and thus their capabilities have been going up year after year.

Expanding Market for IC's, Brought About by Lessening of Restrictions on Exports: The new direction of the defense industry is that electronics and missiles have increasingly been elevating their position in the industry. In the field of domestic development, Toshiba Corp., which developed the 81-type short-range ground-to-air guided missile; Kawasaki Heavy Industries, Ltd., the developer of an antitank guided missile; and Mitsubishi Heavy Industries, Ltd., which developed an air-to-ship missile, are leading. Plans are progressing to remodel the Mitsubishi's air-to-ship missile so it can be used as a ground-to-ship missile. As conceived now, the missile, once fired from inter-land, would speed along, flying over or skirting mountains in its path, and destroy an advancing (enemy) ship before it reached the shore. The missile under development would be highly cost effective since it would be low-priced at 200 million yen or so, yet would do great damage to a ship costing several tens of billions of yen. Thanks to the high-level of Japanese manufacturing technology based on the functional manufacturing system (FMS), missiles developed in Japan can be manufactured cheaply, and the technology is receiving



high appreciation worldwide. Missiles are to be introduced one after another, beginning with the AIM 9L, the manufacture of which is to be started shortly under a license, and the Mark 46 torpedo to be carried aboard the P-3C, and further including the Patriot, the introduction of which as the successor to the Nike Phoenix has become a certainty.

Electronics are said to account for 60 percent of a missile's cost, and Japan is more advanced in research on application of the charge-coupled device (CCD), which is a key to devising guidance systems or solving the problem of jamming. The United States is sounding out the Japanese for a transfer of technology on the CCD so that country will be able to use the device as a homing sensor in missiles.

Outlays for the start of construction of a new BUDGE system (a new automatic warning and control system)—a system for discovering and tracking invading aircraft or missiles—have been appropriated in the fiscal 1983 budget. The prime contractor is Nippon Electric Co., Ltd., and the firm will complete the system by the end of fiscal 1987 in a tieup with Hughes Aircraft Co. of America. Responsibilities of the firms participating in the project are as follows: Nippon Electric Co. will make the computer, the communications circuits control system, the circuits connection system, and its control system; Japan Avionics Co. will manufacture large-size color display screens and the air communication buffer; Mitsubishi Electric Corp. will make flight situation display consoles; Oki Electric Industry Co., Ltd. will manufacture character data consoles; and Toshiba Corp., situation display panels. Contracts for the subsystems—on-base communications systems and electronic exchanges—will go to Fujitsu Ltd. and Hitachi, Ltd., respectively.

For the defense industry of Japan, which has wholly been depending on the Defense Agency, the government's lessening of the ban on arms export—a policy maintained under the so-called "The Three Principles Prohibiting Export of Weapons," which has opened the way for the Japanese export of military technology to the United States alone—will open a new perspective for the industry.

There is a precedent in which the fiber optics technology of Nippon Electric Co. was introduced by the U.S. Department of Defense for building communications networks connecting bases, but in the future exports of general-purpose technologies will become possible as ordinary businesses even if they are to be put to use for military purposes, which gives the industry great hope for an expanded market. The prospects are that the U.S. pressure for accelerated accomplishment of the Defense Guideline and for an increased defense buildup will further increase in the future. It may be said that the Japanese defense buildup in response to the U.S. demand, the lessening of restrictions on weapons exports, and the resulting expansion in the market are giving the defense industry of Japan, which is the leader in high-tech fields such as electronics and new materials, an ample environment for dramatic growth.

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IMAGE PROCESSING FOR SYNTHETIC APERTURE RADAR DESCRIBED

Tokyo TOSHIBA REBYU in Japanese May 83 pp 504-507

[Article by Itsugu Takeshi, Kouzou Hirao, Yoshihito Kuniyasu, and Shigekatsu Horii, all of Komukai Works, Space Program Development Department]

[Text] The synthetic aperture radar (SAR), with the digital processing system for it established, has come to obtain satisfactory results.

Using microwaves, the SAR is characterized by high resolution and all-weather activity; in addition, it affords information with the nature unlike that from the conventional optical sensors utilizing the visible or near-infrared region. Hence it is entertained with the great expectation that it will serve as a new sensor for remote sensing in resources survey and marine operation.

The processing system developed this time can be easily realized by the hardware, which will be fully capable of fulfilling the expectation.

(1) Introduction

Synthetic aperture radar (SAR) is advantageous because an image with very high resolution can be obtained and the surface of the earth can be observed day or night, in any weather, because it uses electric waves in the microwave band which are unaffected by clouds, among other things. The SAR carried on board the U.S. SEASAT operated for only about 3 months. Nevertheless, the data obtained during that period provided high-resolution images, indicating that SAR can become an effective means of observing the surface of the earth; the images formed by microwaves can provide very useful data which are different from what optical sensors operating in the visible and near-infrared range can offer. The characteristics of SAR have also been recognized in Japan; research activities concerning its application to resources survey have been undertaken by various organizations and the results are beginning to accumulate.

However, the raw data obtained by SAR constitute a two-dimensional hologram, and to obtain picture images from these data, the dispersed image information

must be compressed. Although the compression processing can be carried out by optical means, digital processing is preferable because it is capable of carrying out the delicate correction of distortions and producing superior picture images with high precision. On the other hand, compression processing of SAR involves handling of an enormous amount of complicated data,\* so establishment of a data processing method and development of a high-speed processing method for the digital processing of SAR data are urgently needed.

Against this background, algorithms for SAR data processing were established, and a processing method including a method of predicting the processing parameter was developed. This method was then applied to the SAR data gathered by SEASAT, processing was carried out with a general-purpose computer, and satisfactory results were obtained. Therefore, a method of processing SAR data is hereby considered established, so we will continue research for the development of a high-speed processing method. We shall describe hereinafter the principle of SAR image processing, the processing method, and the results.

## (2) The Principle of SAR Data Processing

As shown in Figure 1 (a), SAR is carried on board an artificial satellite platform (although it may also be carried on board an aircraft, the explanation will be given with reference to a satellite), and its antenna beam axis is oriented perpendicular to the orbital path and inclined (toward the earth). The direction in which the platform advances is called the azimuth direction, and the direction perpendicular to it is called the range direction. SAR emits linear FM modulated radar pulses periodically and receives the reflected wave from the surface of the earth. By signal processing the amplitude and phase information of this received wave, image data having high resolution in both range and azimuth directions can be obtained.

Assuming a point target situated on the surface of the earth, the reflected wave of a transmitted pulse will be received with a delay proportional to the distance between the platform and the target, and the signal received is a linear FM signal similar to the transmitted wave. Therefore, by passing a delay line having a frequency-time delay characteristic opposite to that of the transmitted wave, as shown in Figure 1 (b), the power of the received signal can be compressed to a point, and thus the same effect that would be obtained through the use of short pulses can be obtained equivalently. Therefore, the resolution in the range direction can be improved. This is called range compression. This method is used in the conventional pulse compression radar. In digital processing, the transmitted wave is used as the reference function and its correlation with the received wave is computed. This produces the same effect as the delay line described above.

In the azimuth direction, the Doppler frequency generated as a result of the relative motion between platform and target is utilized. This Doppler frequency varies approximately linearly, and the received signal from a point target can be compressed to a point by passing it through a delay line having

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\*In the case of SEASAT, to obtain an image 100 km x 400 km in size, approximately  $400 \times 10^6$  data points must be processed.

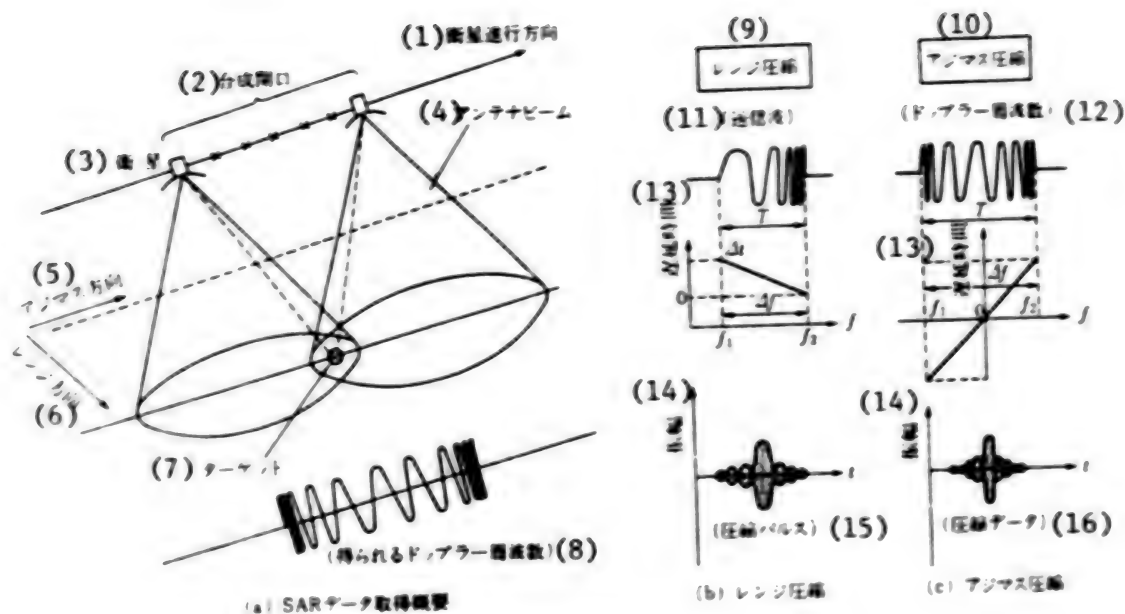


Figure 1. Principle of SAR

Key:

- |                                    |                                 |
|------------------------------------|---------------------------------|
| (a) SAR data processing            | (7) Target                      |
| (b) Range compression              | (8) Resulting Doppler frequency |
| (c) Azimuth compression            | (9) Range compression           |
| (1) Direction of satellite advance | (10) Azimuth compression        |
| (2) Synthetic aperture             | (11) Transmitted wave           |
| (3) Satellite                      | (12) Doppler frequency          |
| (4) Antenna beam                   | (13) Delay time                 |
| (5) Azimuth direction              | (14) Amplitude                  |
| (6) Range direction                | (15) Compressed pulse           |
|                                    | (16) Compressed data            |

a frequency-time delay characteristic as shown in Figure 1 (b) (this is called azimuth compression). The resolution of the data after compression is proportional to the bandwidth of the data before compression, so the resolution can be improved through the use of data taken over an extended period of time if the Doppler rate is assumed to remain constant. In order to obtain data over an extended period of time, an antenna having wide beam width or an antenna having a small aperture should be used. Thus, the resolution in the azimuth direction is improved through the use of an antenna having a smaller aperture. In principle, the resolution can be improved by making the aperture of antenna smaller, but in reality, the size of the aperture on the antenna that can be carried on board cannot be made arbitrarily small, as it is restricted by the transmitted power and the capacity of the receiver. So the achievable resolution is limited.

Now then, the azimuth compression processing, like the range compression, can be performed by digital processing by carrying out the correlation computation

of the signal with a reference function. This reference function can be obtained analytically from the orbital data of the satellite. However, it is usually difficult to obtain a sufficiently accurate azimuth reference function from the orbital data by computation. So a method, which will be described in section 3.2.3, has been developed with which to predict the Doppler rate, which is used as a parameter in the azimuth reference function from the picture image data, and this method is used. Thus, the process of reproducing the picture image from the raw SAR data involves application of a similar processing method to both azimuth and range directions.

### (3) The Processing Method for SAR Image

#### 3.1 The Processing Flow and Its Outline

A flow chart for digital processing of SAR data is shown in Figure 2. The raw SAR data are divided into header portion (containing orbital information) and data portion, and the range and azimuth reference functions are obtained from the information contained in the header portion. The data portion undergoes a number of processes, including range compression, corner turn, and azimuth compression, and the image data thus obtained are used in displaying the picture image on a screen or to make print of the picture.

Range compression and azimuth compression involve correlation computation between the received signal and the reference function, but since there are so many data points, this processing is preferably carried out more efficiently in the frequency range. That is why both range and azimuth compression processing is carried out in the frequency range. The reference functions used in the azimuth compression processing is first generated by the Doppler rate calculated from the orbital information contained in the header portion, and a portion of the picture image is subjected to multilook compression processing. The true Doppler rate is predicted from the pixel shift between adjacent look images thus obtained, and a final azimuth reference function is generated from this true Doppler rate.

#### 3.2 Various Processing Methods

3.2.1 Range Compression. Range compression is a process in which the two-dimensional (both range and azimuth directions) target information is compressed in the range direction. The compression is accomplished by computing the correlation between the data in the range direction and the reference function. In order to carry out computation of correlation at high speed using a computer, a method called FFT (fast Fourier transformation) is employed.

The SEASAT SAR data are given in real numbers, which, after subjected to FFT and shifted on the frequency axis an amount equal to the offset frequency, become complex numbers. These data may be expressed as a function of time as follows.



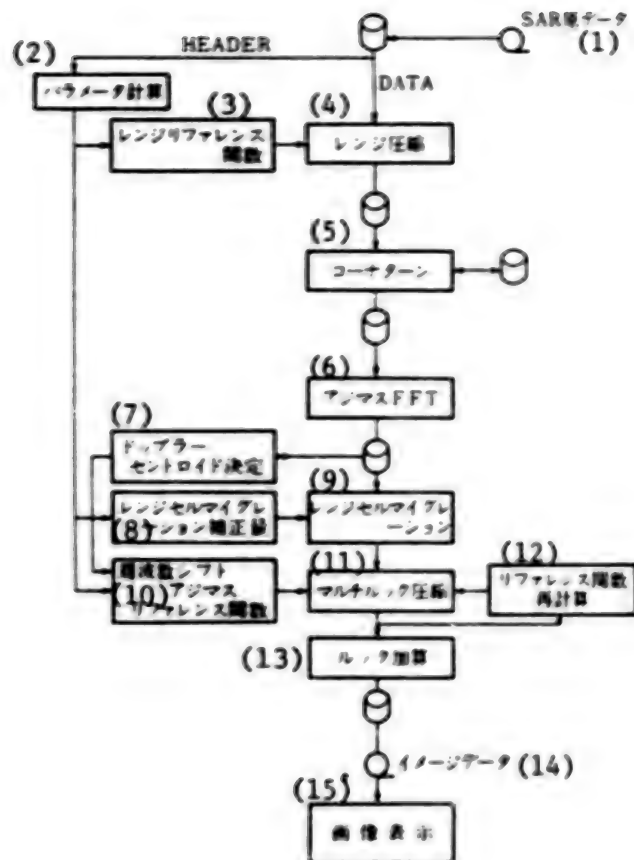


Figure 2. Flow Chart for SAR Data Processing

Key:

- |                                       |  |
|---------------------------------------|--|
| (1) Raw SAR data                      | (8) Range cell migration correction              |
| (2) Parameter computation             | (9) Range cell migration                         |
| (3) Range reference function          | (10) Frequency shift, azimuth reference function |
| (4) Range compression                 | (11) Multilook compression                       |
| (5) Corner turn                       | (12) Reference function recomputation            |
| (6) Azimuth FFT                       | (13) Look summation                              |
| (7) Determination of Doppler centroid | (14) Image data                                  |
|                                       | (15) Image display                               |

$$S(t) = A \exp \left[ 2\pi \left\{ -\frac{kT}{2} \left( t - \frac{2R}{C} \right) + \frac{k}{2} \left( t - \frac{2R}{C} \right)^2 \right\} - \phi(t) \right] \quad (1)$$

$$\frac{2R}{C} \leq t \leq \frac{2R}{C} + T, \quad s(t) = 0 \text{ elsewhere.}$$

where,  $A$  = received signal strength,  $k$  = linear FM rate (chirp rate),  
 $T$  = transmission pulse width,  $R$  = the distance between radar and target,  
 $C$  = the velocity of light,  $\phi(t)$  = Doppler effect and bias phase component.

The reference function used for the purpose of compressing the data represented by equation (1) is given by the following equation,

$$r_1(t) = \exp \left( -j 2\pi \frac{k}{2} t^2 \right) \quad (2)$$

$$-\frac{T}{2} \leq t \leq \frac{T}{2}, \quad r_1(t) = 0 \text{ elsewhere.}$$

Range compression is calculated according to the following equation using equations (1) and (2).

$$y(t) = S(t) \otimes r(t) = S(t) * r(-t) = \mathcal{F}^{-1} \{ \mathcal{F} S(t) \cdot \mathcal{F} r(-t) \} \quad (3)$$

where,  $\otimes$  = correlation,  $*$  = convolution,  $\mathcal{F}$  = Fourier transformation,  $\mathcal{F}^{-1}$  = inverse Fourier transformation

**3.2.2 Corner Turn.** Corner turn is a process in which the data stored in the range direction are rearranged in the azimuth direction in order to facilitate processing of data in the azimuth direction. In other words, the rows and columns of two-dimensional data are transposed, and the process is carried out using a large-capacity disk as a working area.

**3.2.3 Azimuth Compression.** Azimuth compression is a process in which the target information, which has been subjected to range compression, is further compressed in the azimuth direction.

(a) **Azimuth Direction FFT.** In order to carry out azimuth direction processing in the frequency range, the data arranged in the azimuth direction are FFT treated. The peak of these data transformed in the frequency range can be considered to coincide approximately with the direction of the antenna.

(b) **Doppler-centroid.** In carrying out azimuth compression, it is more efficient from the viewpoint of S/N to use data in the vicinity of the antenna beam center, so the data at the antenna beam center are brought to the zero frequency by shifting the data in the frequency range. The frequency at the antenna beam center is determined from the peak value referred to above using the fact that the antenna directivity is represented approximately by the results of azimuth direction FFT.

(c) Range Cell Migration (RCM). RCM is a process in which the target data, which are distributed along a parabola due to changes in the distance, are arranged one-dimensionally for the purpose of azimuth compression. By carrying RCM in the frequency range, the data of target points at equal distance from the satellite orbit can be processed all at once.

The data displacement ( $\Delta r$ ) of RCM can be expressed by the following equation.

$$\Delta r = -\frac{\lambda}{4f_D} (f_D^2(t) - f_D^2(t_0)) \quad (4)$$

where,  $\lambda$  = the wavelength of radar transmission carrier,  $f_D$  = Doppler rate,  $f_D$  = Doppler frequency,  $t_0$  = the time at which the distance between target and orbit is the shortest.

Equation (4) gives the displacement as a function of Doppler frequency, and the displacement is zero at  $t = t_0$ . Incidentally, four-point cubic convolution is used as the method of interpolation when the displacement is computed.

(d) Multilook Compression. The reference function for the azimuth compression is determined by the Doppler rate induced by the relative motion between radar and target. It is represented by the following equation.

$$r_1(t) = \exp(-j2\pi \frac{f_D'}{2} t^2) \quad (5)$$

-  $t_1 \leq t \leq t_2$ , zero elsewhere

where,  $f_D'$  = Doppler rate (approaches a constant with the passage of time).

The  $t_0$ , which determines the interval of the reference function, is determined from a combination of the antenna beam width and the resolution. The reference function represented by equation (5), after FFT, is multiplied with the SAR data. The data obtained by this product are partitioned and then individually subjected to inverse FFT. This process of partitioning and processing the data is called multilook compression.

After inverse FFT, the absolute values of the data are summed up incoherently. The number of partitions is called the look number, and the larger the look number, the lower is the speckle noise (a noise unique to coherent picture image processing). However, to increase the number of partitions means to shorten the length of synthetic aperture per look, which lowers the resolution. In the case of SEASAT data, a look number of 4 yielded a resolution of 25 cm in the azimuth direction.

In this treatment, look numbers of 1 and 4 are used.

(e) Prediction of High Accuracy Azimuth Reference Function. The azimuth reference function, as shown in equation (5), is determined by the Doppler rate. This Doppler rate can be determined accurately if accurate orbital

information on the satellite (or aircraft) carrying the radar is available. However, this information contains errors in general, so it is usually difficult to obtain an accurate Doppler rate from this information. An inaccurate Doppler rate leads to a reduction in the degree of compression in the azimuth direction, with consequent blooming and position shift between looks during a multilook compression process. Prediction of an accurate azimuth reference function is achieved conversely by making a quantitative measurement of these position shifts and then computing the accurate Doppler rate from them. Suppose there are errors in the azimuth reference function, and let the SAR signal in the azimuth direction  $s(t)$  and the azimuth reference function  $r(t)$  be given as shown in Figure 3. The position shift between looks is then given by the following equation.

$$P(i, r) = \frac{2T}{N} (i - r) \left( 1 - \frac{f_{D2}}{f_{D1}} \right) \quad (6)$$

where,  $T$  = duration the target is exposed to the radar irradiation,  
 $N$  = the look number,  $i$  = the  $i$ th look number,  $r$  = the base look number,  
 $f_{D1}$  = correct Doppler rate,  $f_{D2}$  = Doppler rate containing error.

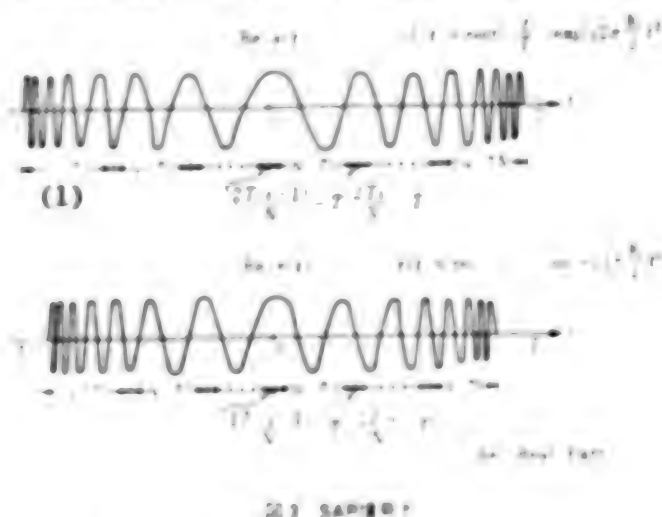


Figure 3. SAR Signal and Azimuth Reference Function

Key: (1) Look

After the position shift is determined by equation (6), the accurate Doppler rate can be predicted from equation (7).

$$f_{D1} = \left\{ 1 - \frac{N \cdot P(i, r)}{2T(i - r)} \right\} f_{D2} \quad (7)$$

This method for predicting the Doppler rate was applied to a set of quasidata and the SEASAT data. A prediction accurate to within  $\pm 0.02$  percent of the true value ( $f_{D2}$  value was varied over a range of 0-10 percent of the value of  $f_{D1}$ ) was obtained from the former. In the latter case, the predicted values fluctuated within  $\pm 0.1$  percent of the average value, but this accuracy was considered acceptable in practice.

#### (4) Conclusion

Algorithms for the SAR data processing and the methods for processing were established, and good results were obtained when these were applied to the SEASAT SAR data. A method for obtaining the azimuth reference function from the picture image data was developed, and as a result, accurate picture image reproduction was achieved. Therefore, the SAR image processing method may be considered to have been established. However, when processing is carried out with a general-purpose computer, the computing time is still too long to be practical. In the future, when SAR has become practical, an image of an area 100 x 100 (km) in size must be able to be processed in 10 minutes or less.

To be able to perform this type of high-speed processing, development of hardware especially designed for SAR data processing is imperative. The algorithms and processing methods developed this time are sufficient for the construction of the hardware and are also capable of meeting future needs. We shall continue our research on the development of special hardware for high-speed processing of SAR data.

#### BIBLIOGRAPHY

1. Wu, C., "A Digital System To Produce Imagery From SAR Data," AIAA Systems Design Review by Sensors, Pasadena, 18-20 October 1976.
2. Sawata, "Correction of Geometric Distortion of SAR Image," Japan Society of Photographic Surveying, Annual Conference, May 1981.
3. Fukuda, et al., "Synthetic Aperture Radar Image Processing," Japan Society of Remote Sensing, Collection of Papers on the First Conference, pp 19-20, 1981.
4. Takeishi, et al., "Prediction of Parameters in Synthetic Aperture Radar Image Processing," Japan Society of Remote Sensing, Collection of Papers on the Second Conference, pp 143-146, 1982.

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DESIGN AND APPLICATION OF TOSHIBA'S 64 K CMOS RAM DISCUSSED

Tokyo TOSHIBA REBYU in Japanese May 83 pp 533-538

[Article by Kiyofumi Ochi, Kenji Koguchi, and Kiyoshi Kobayashi: "The 64 K Bit Complete Static CMOS RAM"]

[Text] [1] Introduction

Since the 1 K bit CMOS RAM was developed in 1975, a CMOS RAM with roughly four times the capacity of its predecessor has been developed and marketed ahead of the rest of the world every 2 years, and we now have developed and placed on the market a 64 K bit completely CMOS RAM, the TC 5564 P.

The CMOS is associated with low current consumption, it has a wide range of operating temperatures, and it is very easy to use such that it is finding applications over a wide area, particularly in systems requiring battery backup. The new product is believed to pursue the conservation of energy concept still further while introducing the possibility of the high speeds attainable with the CMOS RAM so that it is believed its area of application as well as its market will be expanded further.

This paper will discuss the completely CMOS 8 K x 8 bit makeup, discussing the design and applications of the TC 5564 P that was developed through this company's CMOS VLSI design and production technology.

[2] Process Parameters and Cell Layout

2.1 Process Parameters

A 2  $\mu$ m rule two-layer polysilicon CMOS technology based on the P-well mode is used for the 64 K CMOS RAM. The 3  $\mu$ m rule used for this company's 16 K CDRAM is reduced by reduction projection exposure and reflective ion etching (RIE) type fine working technology, and the great reduction in the P<sup>+</sup>-N<sup>+</sup> diffusion interval of the P-well boundary section and the two-layer polysilicon structure for greater densification are the features. The 2  $\mu$ m rule process and the 3  $\mu$ m rule process are compared in Table 1.

Table 1. 3  $\mu\text{m}$  CMOS Process for 16 K CRAM and High Performance CMOS Process for 64 K CRAM

	16K CMOS RAM	64K CMOS RAM
(1) プロセス	(2) 一層ポリシリコン	(3) 二層ポリシリコン
(4) ゲート長 (NMOS)	3 $\mu\text{m}$	2 $\mu\text{m}$
(4) ゲート長 (PMOS)	3.5 $\mu\text{m}$	2.2 $\mu\text{m}$
(5) ゲート酸化膜厚	700Å	450Å
(6) 拡散深さ (N <sup>+</sup> )	0.4 $\mu\text{m}$	0.25 $\mu\text{m}$
(6) 拡散深さ (P <sup>+</sup> )	0.6 $\mu\text{m}$	0.5 $\mu\text{m}$
(7) ポリシリコン幅・間隔	2.5 $\mu\text{m}$ / 2.5 $\mu\text{m}$	2 $\mu\text{m}$ / 2 $\mu\text{m}$
(8) メタル幅・間隔	2.5 $\mu\text{m}$ / 3.5 $\mu\text{m}$	2 $\mu\text{m}$ / 2 $\mu\text{m}$
(9) コンタクト孔サイズ	2 $\mu\text{m}$ $\times$ 3 $\mu\text{m}$	2 $\mu\text{m}$ / 2 $\mu\text{m}$
(10) ウェルの深さ	10 $\mu\text{m}$	7 $\mu\text{m}$ / 5 $\mu\text{m}$
(11) P <sup>+</sup> -N <sup>+</sup> 間隔	10 $\mu\text{m}$	8 $\mu\text{m}$ / 6 $\mu\text{m}$
		64K CRAM, 16K DRAM

Key:

- |                                 |   |
|---------------------------------|---|
| 1. Process                      | 7. Polysilicon (width/interval)             |
| 2. One-layer polysilicon        | 8. Metal (width/interval)                   |
| 3. Two-layer polysilicon        | 9. Contact hole size                        |
| 4. Gate length                  | 10. Well depth                              |
| 5. Thickness of gate oxide film | 11. P <sup>+</sup> -N <sup>+</sup> interval |
| 6. Junction depth               |   |

First of all, fine working of CMOS FET is unlike fine working of NMOS LSI in that the proportionate reduction is not uniform, and fine working has to be applied under a fixed set of restrictions. This requires fine working while maintaining balance between PMOS and NMOS characteristics to avoid loss of the maximum features of low power consumption property and wide power source margin and thereby attain high performance.

The top impediment to fine working of CMOS is the fine working of PMOS. Where as of small diffusion coefficient can be used in NMOS for the N<sup>+</sup> region formation, presently there is no recourse but to use B of large diffusion coefficient in PMOS. The depth of the diffusion layer  $X_j$  invites increased layer resistance  $\rho_s$  and is not suited to high speed operations. Here, ion injection technology and low temperature processes were introduced to suppress the  $X_j$  for N<sup>+</sup> diffusion and P<sup>+</sup> diffusion at 0.25  $\mu\text{m}$  and 0.5  $\mu\text{m}$  ( $\rho_s < 50 \Omega/$  ).

In addition, the concentrations of the N type base plate and P-well were lowered while a deep ion injection layer to prevent punch through was formed at the channel section in order to promote high speed operation while the junction capacity was made smaller and the gate length  $L$  was reduced.  $L = 2.0 \mu\text{m}$  and  $2.2 \mu\text{m}$  NMOS and PMOS transistors were developed as a result. At this time, the concentration profile was optimized and the channel leak current was suppressed in order to maintain low current consumption.

In the six transistor makeup CMOS cell with extremely low power consumption, the reduction in area of the P-well boundary region which accounts for about 30 percent of the total cell area became the key to a higher degree of integration. The junction depth of the P-well junction was made shallower in this process and the N base plate P-well concentration profile was optimized without loss in pressure resistance while the P<sup>+</sup>-N<sup>+</sup> interval was reduced to 6  $\mu\text{m}$  which is equivalent to close to half that for the 3  $\mu\text{m}$  process.

## 2.2 Memory Cell

The memory cell used in the CMOS static RAM is comprised of the two types of E/R type cell and the CMOS type cell. The E/R type cell has a high resistance polysilicon charge element stacked over the upper layer of the NMOS transistor as a result of which the cell area determined by the layout of the four NMOS transistors is smaller than that of the CMOS type cell. On the other hand, the CMOS type cell uses a PMOS transistor with switching capability as its charge element, and it is an extremely low power consumption type cell which passes no current other than the leak current during the time of rest.

This company has developed the two types of six-transistor makeup CMOS type cell making up the TC 5564 P and the E/R type cell YC 5565 P, and the process is basically the same as that seen in Table 1, and they differ in the manner the polysilicon is used at the second layer. That is to say, where a high resistance charge element is used in the E/R type cell, a low resistance  $V_{SS}$  line is used in the CMOS type cell.

By stacking together the two CMOS inverters making up the  $V_{SS}$  line, bit line, and flip flop in layered manner within the same area, the cell is comprised of four metal lines per cell making possible cell size of  $19\mu\text{m} \times 22\mu\text{m}$ . Compared to this company's 16 K CRAM which uses five metallines in the  $3\mu\text{m}$  rule, an area ratio reduction of 37 percent has been realized.

### [3] Mode Design and Circuit Design

#### 3.1 Basic Mode

The great feature of the CMOS RAM is its low power consumption. It uses a CMOS type memory cell at rest while the peripheral circuits are made up of CMOS, thereby cutting off all circuit current so that the current consumed at time of rest is the sum of the leak currents of the elements in the design. On the other hand, transient currents and DC currents flow, even though this is CMOS, when the system is operating, and in the particular situation of a completely static RAM with a circuit mode which does not require an external clock, a DC current pathway is created for the discharge from the bit line pull up charge to the memory cell NMOS during the period that there is access to the memory cell, and the maximum current expended through this pathway was unavoidable in circuit modes used in the past.

This company had already resolved this difficulty in the completely static type 16 K CMOS RAM, the TC 5517 BP/18 BP, which it had previously developed by internal synchronization of the circuits, and a similar mode was adapted to the TC 5564 P. That is to say, the variations in load address  $A_0$ - $A_7$  and column address  $A_{12}$  input voltages were detected internally to form the basic clock  $\phi_p$ , and the various timing control clock systems made from  $\phi_p$  were used to convert the major part of the principal operations to dynamic operations and thereby completely eliminate all DC pathways during operation.

As illustrated in Fig 1, the bit line is not pulled up with a charge element but is charged for a fixed period with the precharge circuit for each memory cell. This mode, called the address transition detection mode, completely eliminates

current consumption during steady state except for a fixed period during memory cycle changes as a result of which the current consumption during dynamic steady state is zero just as during rest.

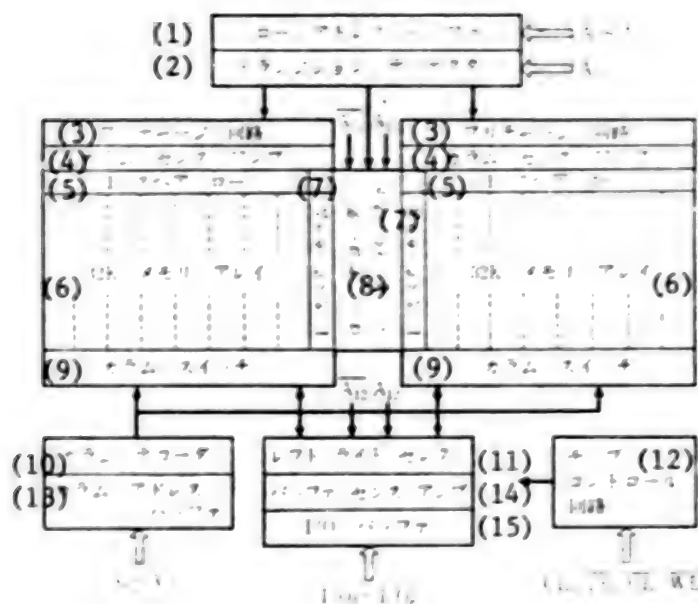


Figure 1. Block Diagram of TC 5564 P

#### Key:

- |                           |                           |
|---------------------------|---------------------------|
| 1. Low address buffer     | 9. Column switch          |
| 2. Transition detector    | 10. Column decoder        |
| 3. Precharge circuit      | 11. Left/right select     |
| 4. Column sense amp       | 12. Chip control circuit  |
| 5. One spare row          | 13. Column address buffer |
| 6. 32 K memory array      | 14. Buffer sense amp      |
| 7. One spare column       | 15. I/O buffer            |
| 8. Row decoder and buffer |                           |

The TC 5564 P has an 8 K word x 8 bit byte wide memory makeup. The 64 K memory cell is divided and deployed into two 32 K memory arrays with an interspersed row decoder in the manner diagrammed in Figure 1. This results in only one side memory being selected at any given time depending on the column address input A12, and the other memory array assumes a state of rest. By the use of this mode, the dynamic transient current accompanying access to the memory cell has been reduced to roughly half of what was required in the total memory access mode used in the past.

#### 3.2 Circuit Design

The principal sections of a memory circuit controlled by various timing clocks formed from the basic  $\phi_p$  clock are shown in Figure 2. The bit line is precharged by a  $\phi_p$  before a memory cell is accessed by a word line, and the information of

the previous memory cycle which was in the bit line is cleared. The row decoder is divided into the predecoder and the main decoder, and this is designed to speed up the main decoder which is under the control of  $\phi_{p2}$  timing.

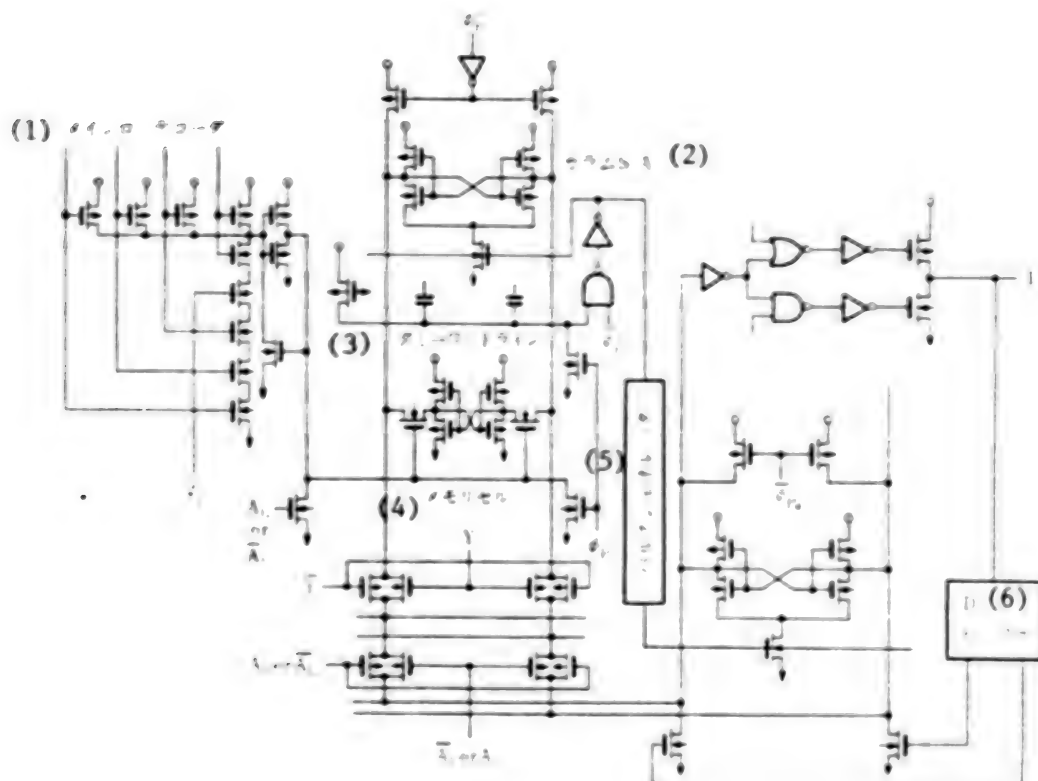


Figure 2. Main Peripheral Circuit of TC 5564 P

Key:

- |                     |                    |
|---------------------|--------------------|
| 1. Main row decoder | 4. Memory cell     |
| 2. Column S/A       | 5. Pulse generator |
| 3. Dummy word line  | 6. DIN buffer      |

The row decoder selection has its timing set so that there is overlapping with the initial stage of the bit line in order to operate within a range where no erroneous read-in occurs. The information readout on the bit line undergoes two-stage amplification through the column sense amp and the buffer sense amp. This is a dynamic type sense amp comprised of flip flop with both sides balanced, and it is latched with a suitable timing signal generated at the dummy word line. The buffer sense amp which amplifies the signals from the I/O line is driven by a pulse signal of roughly 10 ns width, and in addition to amplification of the readout data, it is also used as an information amplification amp for write-in in order to speed up the write-in operation.

There is a total of about 400,000 elements making up the above mentioned memory circuit and the peripheral circuits of the 64 K CMOS RAM. The chip size is 6.58 mm x 7.50 mm, and the density of the integrated elements is roughly 8,000 element/mm<sup>2</sup> or more.



#### [4] Redundant Circuit Technology

The TC 5564 P accesses spare memory cells made available beforehand to replace faulty memory cells once they are discovered in order to improve the production yield of the 64 K CMOS RAM with high integrated element density, and this technology rescues a chip which otherwise would have been deemed unfit for retention as a serviceable chip. This is called redundant circuit technology and is claimed to be an indispensable technology to VLSI, and this country was the first in the world to introduce this technology in the area of static RAM.

The scale and deployment of the memory cells within the chip need to be established at the optimum levels for the particular device. As illustrated in Figure 1, the TC 5564 P has one line of spare row and two lines of spare columns. The two lines of spare columns are used to replace columns of unfit members in the array to the respective side. The number of the row or column which contains the unfit cell is recorded by programming the spare decoder installed beforehand. A polysilicon fuse is used as the programming element. A section of the fuse element inserted between connection points within the decoder is ruptured with laser irradiation to record the unfit number into the spare decoder.

The method for rescuing unfit chips that was described above uses a spare memory cell whenever there is a memory cell which does not operate functionally, but simply rescuing the functional operation does not suffice when the memory cell is faulty because it is accompanied by a current leaking circuit. Particularly in the situation of the CMOS RAM whose extremely low power consuming property is required to enable battery backup, the presence of a leak current of a faulty memory cell even at rest can be fatal.

A method for severing electrically the line which serves as the power source to faulty memory cells has been introduced in order to further enhance the rescuing efficiency in the TC 5564 P. This involves the placement of a polysilicon fuse between one end of the  $V_{CC}$  line of a memory cell which was connected by P+ diffusion in the row direction and the power source line, and when the faulty row number is programmed into the spare row decoder, this fuse for power isolation is severed at the same time. The  $V_{CC}$  line of a memory cell has a common layout with the  $V_{CC}$  line of the memory cells that is in the neighboring row, and the actual situation is that a pair of spare rows is provided and a method in which pair substitution is always possible has been adopted.

This power isolation method is believed to provide a capability that can be exploited to a very high level against faulty behavior such as intermetallic shorts in CMOS type cells with extremely high density of metal distribution lines.

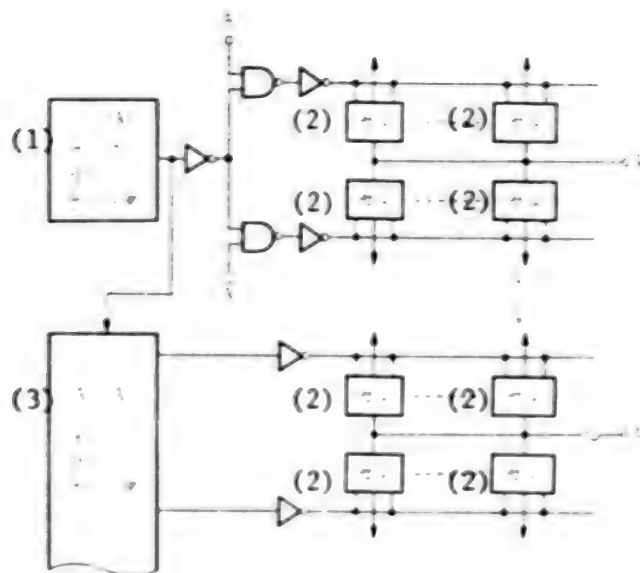


Figure 4. Redundancy for Power Isolation

Key:

1. A<sub>1</sub>-A<sub>7</sub> spare row decoder

2. Cell

3. A<sub>1</sub>-A<sub>7</sub> main row decoder

#### [5] Applications of TC 5564 P

##### 5.1 Features of TC 5564 P

**5.1.1 Interchangeability with EPROM:** The TC 5564 P has the capability of direct substitution for a 2764 type EPROM in a printed circuit board so that it can be used with very high degree of selectivity of RAM capacity and ROM capacity in microcomputer systems in a wide field of applications.

**5.1.2 Three-Control Inputs:** The TC 5564 P is provided with two chip enable /phonetic/ inputs (CE<sub>1</sub>, CE<sub>2</sub>) of differing logic for the purpose of providing a minimum standby current mode that is effective for battery backup applications and an output enable input (OE) for the purpose of high speed readout. By the use of this combination of three-control inputs, various applications are possible.

**5.1.3 Low Standby Current:** As discussed in the preceding paragraph, the TC 5564 P uses a completely CMOS circuit because of which it consumes the very small current of but a few 10 nA as standby standard current. This is why a backup with a very small battery such as a lithium battery makes possible the design of a system which maintains data over several hours (several thousand hours).

**5.1.4 High Speed, Low Operating Power:** The access time has been set at 100 ns in the high speed products and at 150 ns for the general run products put out on the market, and a 5 MHz clock can be used with the 8085 MPU system and a 6 MHz clock with the Z-80 MPU system.

In addition, the power consumed during operation is 250 mW and small, and this is very effective in lowering power consumption of large capacity memory systems. The properties of the TC 5564 P are listed in Table 2.

Table 2. AC/DC Characteristics

(1) AC 電気的特性			(2) DC 電気的特性		
	TC5564P-10	TC5564P-15		TC5564P-10	TC5564P-15
	TC5564P-10	TC5564P-15		TC5564P-10	TC5564P-15
(3) アドレスアクセス時間	10ns	15ns	(7) 待機電流	500μA	500μA
(4) $\overline{CE}_1$ アクセス時間	10ns	15ns	(8) 動作電流	250mA	250mA
(5) $\overline{CE}_2$ アクセス時間	10ns	15ns			
(6) $\overline{OE}$ アクセス時間	10ns	15ns			

Key:

- |                                  |                                  |
|----------------------------------|----------------------------------|
| 1. AC properties                 | 5. $\overline{CE}_2$ access time |
| 2. DC properties                 | 6. $\overline{OE}$ access time   |
| 3. Address access time           | 7. Standby current               |
| 4. $\overline{CE}_1$ access time | 8. Operating current             |

5.1.5 Interchangeability of Pin Positions: The pin placement of the PC 5564 P has taken into account ready interchangeability with other 8 bit makeup memory so that the degree of freedom in system design has been increased, and debugging is readily conducted whenever there is a rise up.

The byte memory family of 8 bit makeup is shown in Table 3 and an example of a common base plate between the 16 K CRAM (TC 5517 BP) and the 64 K CRAM (T 5564 P) is shown in Figure 5.

Table 3. Toshiba Byte-Wide Memory Pin Out

(1)	(2)	(3)	(4)	(4)	(3)	(2)	(1)
Pin No.	Symbol	Function	Pin No.	Symbol	Function	Pin No.	Symbol
1	$\overline{CE}_1$	Chip Enable 1	16	$\overline{CE}_2$	Chip Enable 2	31	$\overline{OE}$
2	$\overline{CE}_2$	Chip Enable 2	17	$\overline{OE}$	Output Enable	32	$\overline{CE}_1$
3	$\overline{OE}$	Output Enable	18	$\overline{CE}_1$	Chip Enable 1	33	$\overline{CE}_2$
4	$\overline{CE}_1$	Chip Enable 1	19	$\overline{OE}$	Output Enable	34	$\overline{CE}_1$
5	$\overline{CE}_2$	Chip Enable 2	20	$\overline{CE}_2$	Chip Enable 2	35	$\overline{OE}$
6	$\overline{OE}$	Output Enable	21	$\overline{CE}_1$	Chip Enable 1	36	$\overline{CE}_2$
7	$\overline{CE}_1$	Chip Enable 1	22	$\overline{OE}$	Output Enable	37	$\overline{CE}_1$
8	$\overline{CE}_2$	Chip Enable 2	23	$\overline{CE}_2$	Chip Enable 2	38	$\overline{OE}$
9	$\overline{OE}$	Output Enable	24	$\overline{CE}_1$	Chip Enable 1	39	$\overline{CE}_2$
10	$\overline{CE}_1$	Chip Enable 1	25	$\overline{OE}$	Output Enable	40	$\overline{CE}_1$
11	$\overline{CE}_2$	Chip Enable 2	26	$\overline{CE}_2$	Chip Enable 2	41	$\overline{OE}$
12	$\overline{OE}$	Output Enable	27	$\overline{CE}_1$	Chip Enable 1	42	$\overline{CE}_2$
13	$\overline{CE}_1$	Chip Enable 1	28	$\overline{OE}$	Output Enable	43	$\overline{CE}_1$
14	$\overline{CE}_2$	Chip Enable 2	29	$\overline{CE}_2$	Chip Enable 2	44	$\overline{OE}$
15	$\overline{OE}$	Output Enable	30	$\overline{CE}_1$	Chip Enable 1	45	$\overline{CE}_2$

Key: Table 3.

- |              |             |
|--------------|-------------|
| 1. 256 K bit | 3. 32 K bit |
| 2. 64 K bit  | 4. 16 K bit |

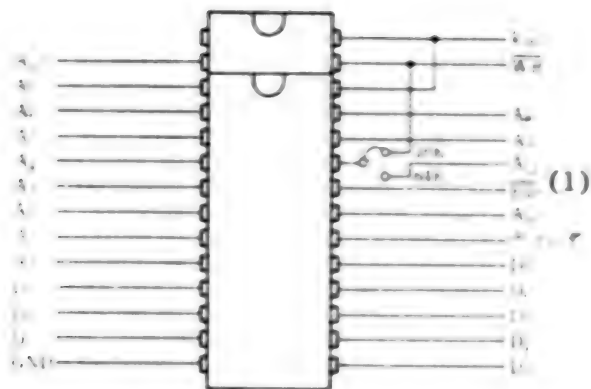


Figure 5. Interchangeability of TC 5564 P on  
Common Use PC Board with TC 5517 BP

Key:

1. Decoder

## 5.2 Application to Microcomputer System

As an example of such an application, a RAM/ROM system using a Z-80 type MPU is shown in Figure 6, and its timing chart is shown in Figure 7. The lower rank 16 K byte is solely for 64 K ROM use while all others are designed for direct interchanges with EPROM or TC 5564 P. Here a 26-pin (EPROM; NC, RAM; CE<sub>2</sub>) is connected to the power source and the 27-pin (EPROM; PGM, RAM; R/W) connected to  $\overline{WR}$  whereupon the true values are satisfied. That is to say, even when the PGM becomes active in the light cycle, the EPROM output becomes disabled so that there is no competition between data.

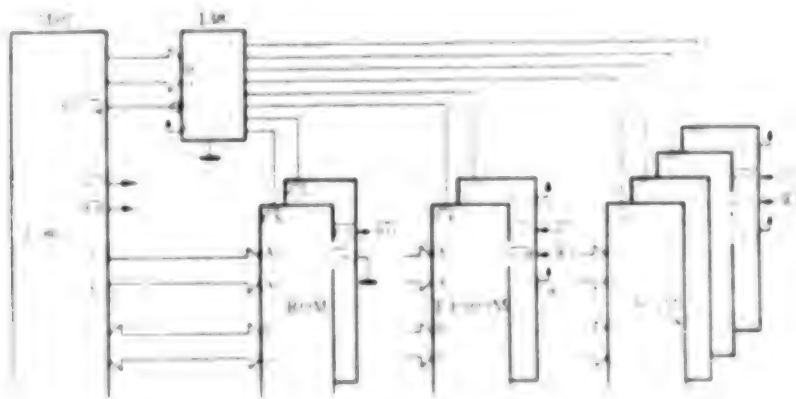


Figure 6. Example of Memory System with MPU

When the system is turned to higher speed, the memory is accessed through  $\overline{CE}_1$  so that the display delay time of the decoder in the figure becomes a problem. There is need to be aware that the memory access time is the access time required for the MPU from which the display time is subtracted. At the same time, the TC 5564 P has a circuit makeup in which current is not consumed at steady state other than near an address change as indicated in Figure 8 for making it a high speed and low power system as was mentioned before. To this end, a peak current of the order of several hundred mA flows during an operating period and the power source voltage may undergo fluctuations so that it is important to add on an  $0.1 \mu\text{F}$ /device bypass condenser on the power source line near the memory.

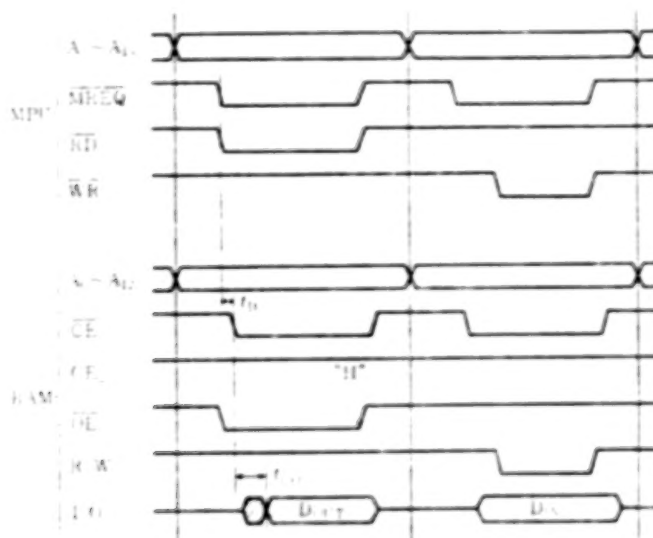


Figure 7. System Timing Chart

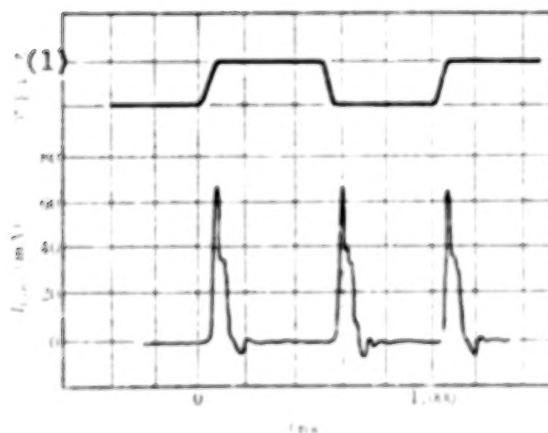


Figure 8. Operating Current Waveforms

Key: 1. Address



### 5.3 Application to Battery Backup System

It is the usual situation in a system using RAM that the RAM data are destroyed should the power supply be cut off. This is why a backup with a battery becomes necessary when a non-volatile memory is desired. The TC 5564 P has such a very small standby current that by introducing a battery backup, a non-volatile memory can be provided making it possible to guard against destruction of data due to power outage and design a system which will retain data over a long period with low power consumption.

An example of a simple battery backup system is illustrated in Figure 9 and its timing chart is shown in Figure 10. The section within the dotted lines is the interchangeable circuit between the system power source and the backup power source while DRC is the chip control signal for use with the memory data protect. The point of special caution in this circuit is, first of all, DRC must be of a low level until the system power source drops down to 4.5 V, and, in the course of recovery, a return to high level is made after  $t_{RC}$  (lead cycle time) after a voltage of 4.5 V has been attained in the design that is adopted. Next, the power source switchover will require a timing of the type illustrated in the figure. This is to guard against cutting short the battery life because  $I_{DDP}$  (several mA) flows when DRC is between -0.2 V and 2.2 V of the power supply.

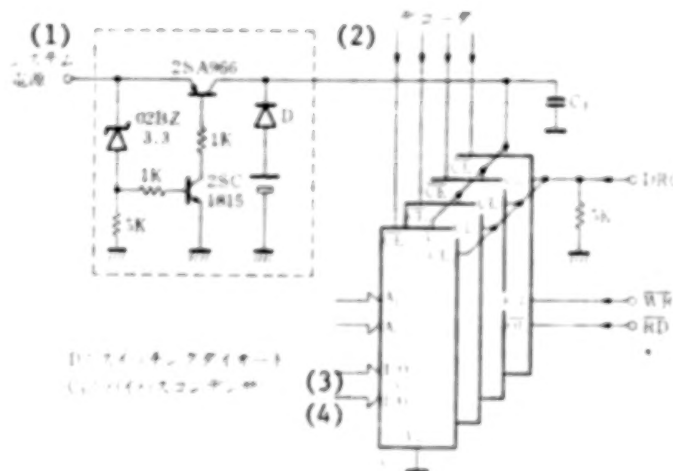


Figure 9. Example of Battery Backup Circuit

Key:

- |                        |                             |
|------------------------|-----------------------------|
| 1. System power supply | 3. D: switching diode       |
| 2. Decoder             | 4. $C_p$ : bypass condenser |

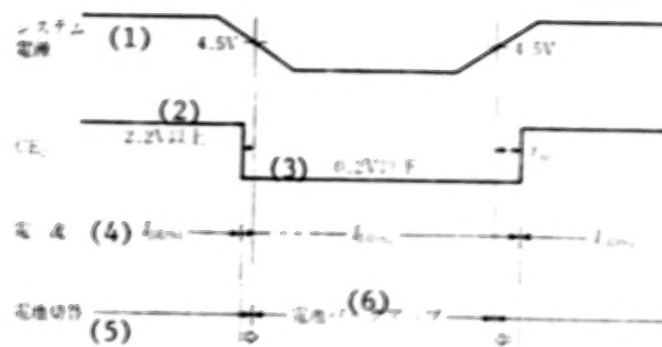


Figure 10. Timing Chart of Battery Backup Circuit

Key:

- |                        |                       |
|------------------------|-----------------------|
| 1. System power supply | 4. Current            |
| 2. More than 2.2 V     | 5. Battery changeover |
| 3. Less than 0.2 V     | 6. Battery backup     |

#### [6] Post Statements

As discussed in this paper, the TC 5564 P, while being a completely CMOS type static RAM, also overcomes the deficiency of lack of high speed operating capability inherent in past CMOS, and it has materialized the very fast operating speed of less than 150 ns access time despite a very large capacity on the order of 64 K bits, and by use of an address transition detection mode makes possible operating current consumption of 5 mA or less ( $t_{\text{cycle}} = 1 \mu\text{s}$  time) and further exploits the features of CMOS RAM. We hope to develop and extend this CMOS VLSI technology to other product areas very actively and we plan to come forth with CMOS of even greater capabilities.

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Sept. 7, 1983